ONGERUBRICEERD

TNO-report

96-CMC-R0294 **SHOCK TRIALS TROJKA DRONE; MEASUREMENTS SHOT 1, 2 and 3**

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Mijnenbestrijdingsoperaties met de op afstand bestuurde Trojka drones vereisen een grote schokbestendigheid van deze schepen.
Een eerste serie van drie schokproeven met onderwater explosies vond augustus 1996 plaats. Daarbij werd een 16 m lange beballaste proefromp, met daarin opgesteld een zwevende vloer, zwaar op schok belast.
Het doel van deze proefnemingen is om duidelijker de grenzen van de operationele inzetbaarheid te kunnen aangeven en over meer gegevens te kunnen beschikken betreffende de optredende schokbewegingen. Die moeten dan vertaald worden naar het Schokbestek voor Trojka.

In opdracht van de Afdeling Scheepsbouw, Bureau SO&O, heeft TNO met ruim 50 meetkanalen versnellingen, rekken, relatieve verplaatsingen en drukken vastgelegd.
Dit rapport beschrijft deze metingen en presenteert alleen de meetsignalen.

In het kader van een andere opdracht (A96/KM/147) is inmiddels begonnen met de interpretatie van die meetsignalen en de betreffende rapportage.

Contents

1. Introduction

The Royal Netherlands Navy started a research project for modernizing the mine sweeping capabilities.
A part of the project investigates the possibilities to use a system of mine sweeping drones which are unmanned and remotely operated, called Trojka system.
Because the Trojka system will be exposed to severe underwater explosion shock loadings, extreme high demands were set with respect to shock resistance.
In order to investigate the behaviour of the Trojka structure against shock load, underwater shock load tests were carried out on a full scale test model of the Trojka vessel. This report gives a description of the first series of shock tests.

The project is done in close cooperation with the Wehrtechnische Dienststelle für Schiffe und Marinewaffen (WTD71). The measurements have been carried out near Eckernförde, Germany. WTD71 did additional measurements as laser displacements, pressure transducers and accelerometers.
This report only contains the measured results of TNO.
In July and August 1996 only the first series of 3 shots have been carried out. The second series of 3 shots has been planned to take place in october 1996.
The strain gauges were mounted by the 'Marine Electronisch en Optisch Bedrijf'(MEOB) as well as the cabling inside the drone. The measuring cables from drone to measuring ship were provided with connectors by the MEOB.

2. Objectives

One of the objectives of the first series of tests is to assess the response of the drone and the floating deck and to assess the resistance of the structure to underwater shock loads. The shock behaviour will be described in a future interpretation report and will be used for the shock specifications of the Trojka drones.

3. Experimental setup and measurement system

3.1 Test setup

The test setup, charge geometry and resulting damage are described in a separate report of the Royal Netherlands Navy [1].

3.2 Measurement locations

The following transducers have been used :
- a trigger signal device;
- the detonation signal device;
- 25 strain gauges;
- 4 relative displacement transducers;
- 24 accelerometers;
- 1 pressure transducer.

The transducers are indicated as follows :
S: strain gauge;
A: accelerometer;
R: relative displacement transducer between shell and floating deck;
P: pressure transducer in the water.

Definition of Drone sections :
1: aft compartment;
2: engine room;
3: fuel tank;
4: fore compartment.

Definition of the axes :

0-point all axes	: centre of aft bulkhead, outside;
+x axis	: from 0-point to bowsection;
+y axis	: from 0-point to P.S;
+z axis	: from 0-point up.

Table 1 gives the coordinates of the transducers.
The position of the transducers are graphically presented in figure 1.

3.3 Data acquisition system and signal conditioning

All used accelerometers and the pressure transducer are piezo resistive because this type of transducers gives the best results on shock.

Accelerometers A1 to A16 have been mounted using a so-called mechanical filter (an aluminium-rubber interface) [2]. For these locations undamped accelerometers of Endevco type 7270A-6K (range 6,000 g) and 7270A-20K (range 20,000 g) have been used.
Accelerometers A17 to A24 are mounted on the floating deck. Internally damped accelerometers of Endevco type 2262A-200 (range 200 g) have been used.
The transducers have been calibrated prior to testing and checked afterwards again. The acquisition equipment is calibrated regularly.
For signal conditioning and acquisition a 58 channel SCADAS-II system equipped with PDFA-ETD modules (make Difa) was used.
The sampling frequency is 16129 Hz.
To make a higher sample rate possible a 16 channel DSA210 (make Difa) and a 32 channel DSA230 (make Difa) have been used with a sampling frequency of 51200 Hz.
The trigger signal, detonation signal, A1 to A16, P and all of the strain signals have been measured with a sampling frequency of 51200 Hz.
All the measuring systems used, operated with a 16 bits ADC and the analogue low pass filters are optimized for linear phase characteristic to ensure an undistorted time history.

3.4 Calibration of accelerometers

All accelerometers were calibrated according to ISO 5347 part 3, using a shaker and a primary standard accelerometer.
The type 7270A-6K and 7270A-20K accelerometers were supplementary calibrated on shock, using a Hopkinson bar and a laser displacement sensor as a reference.

In order to get information about the reliability of the double integrated acceleration signals some measurements were done using the Hopkinson bar.
It is found that the 7270A-20K accelerometers give good displacement results over a timeperiod between 10 and 25 ms (the mean timeperiod of valid displacement signals is 22 ms). The 7270A-6K accelerometers give good displacement results over a timeperiod between 20 and 30 ms (the mean timeperiod of valid displacement signals is 26 ms). The length of the valid part depends mainly on the transducer itself.
For the 2262A-200 accelerometers a double integration over 500 ms is normally no problem.

3.5 Calibration of pressure transducer

A static calibration of the pressure transducer has been carried out using a primary standard.
The pressure transducer was tested dynamically using a special water tube in which the actual shock signal is simulated.

The pressure transducer which was used cannot measure negative pressure values accurately. When a negative pressure occurs this transducer will create a lot of noise.

4. Results

Already before shot 1 strain gauge S9 was not working. Probably it was damaged during transport. There was no opportunity to repair this strain gauge.

The acceleration signals have been integrated in time in order to obtain absolute velocities. The zero level, as measured, is corrected prior to time integration by adding a scalar (taking into account the threshold of the accelerometer). No further adjustments have been made to make a good interpretation possible.
The integrated accelerations were integrated in time again in order to obtain absolute displacements.
The integrator used, operates by the trapezium algorithm.
The maximax shock response spectra were calculated from the acceleration signals at 1 % damping with 24 points per octave.

The nature of the signal depends on the location. On the floating deck for instance the signals are much slower. The duration of the presented signals were choosen as good as possible in agreement with the nature of the signals.
Table 2 gives an overview of the presented figures of shot 1, table 3 gives an overview of the presented figures of shot 2 and table 4 gives an overview of the presented figures of shot 3.

Time 0 is the detonation time.
All accelerometer signals are positive in the positive direction of the axes in which direction they are mounted. (The definition of the axes are given in chapter 3.2)
The relative displacement transducers R1 to R4 gives a negative signal due to shortening. The floating deck moves much more vertically than horizontally so the signals of R2 and R4 will not purely be the horizontal movements (They are influenced by the vertical movements).

During shot 1 small overloads occurred at the signals of A17, A22 and A23.
From some sensors there were small DC-shifts and spikes in the time signals. Those disturbances are typically for cabling problems and connection problems.
It was found that the connectors of the long measuring cable give problems when these are hit in transverse direction.
The large first peak of strain gauge S10 is probably caused by cabling problems.
Difficulties with the integration occurs when there is a high noise level in the acceleration signal and/or when the signals are disturbed, for instance by connector problems.
The signals of A4, A7, A9, A12 and A15 are disturbed.
To demonstrate the effects of small disturbances, the signals of A9 and A12 were 'corrected' using one small block and one spike on both signals (figures 1B105 and 1B1 06). After this, the integrated results (velocities and displacements) looks reliable (figures 1B107 to 1B110).
Of course the result of the maximax shock response spectra calculation is influenced as well by disturbances of the time histories.

During shot 2 there still were some connector problems.
The large peaks of strain gauge S10 are probably caused by cabling problems.
Integration of A1, A4 to A9, A11, A12, A14, A15 and A24 shows that these signals are disturbed.
The results of the maximax shock response spectra calculations are influenced by these disturbances.

During shot 1 and shot 2 the relative displacement transducers were able to measure in the range between -100 mm and +100 mm. Before shot 3 the vertical relative displacement transducers R1 and R3 were given a mechanical offset in such a way that they were able to measure from -170 mm to +30 mm. When +30 mm relative displacement is reached the transducer will be damaged and the signal will be meaningless. For R1 this happened 137 ms after detonation, for R3 149 ms after detonation.

Strain gauge S10 failed at the onset of shot 3.
During shot 3 there still were some connector problems.
Integration of A1, A3 to A9, A11, A12, A18 and A24 shows that these signals are disturbed.
The results of the maximax shock response spectra calculations are be influenced by these disturbances. To avoid some of those disturbances the maximax shock response spectrum of A3 is calculated only over the first 8 ms signal and of A10 only over the first 160 ms signal. The signal of A11 is disturbed that much, that it has no sense to calculate the shock response spectrum.

A final remark concerns the specific mentioning in the foregoing text of those acceleration signals being disturbed during the verious shots. Contemplating these signals after integration (velocity results), it is quite clear from the signals themselves that they are showing defects.
Note that there are other acceleration signals, not mentioned before, which suffer to some extend from these disturbances as well.
For instance during shot 1 the signals of A11 and A13 (and their integrated results) do not look suspicious. But one should expect that they should lead roughly to the same displacement, as they are on the same bulkhead. This is not true for longer timeperiods. For instance 60 ms after detonation, which is about 40 ms after shock wave arrival, the displacement at A11 is 105 mm and at A13 it is 37 mm.
However, as mentioned in chapter 3.4, the expectation is that, for the double integrated accelerations of sensor A1 to A16, only a small part of the displacement signal is valid.
The length of the valid part depends mainly on the transducer itself and is between 10 ms and 30 ms.
Only the transducers on shell, foundation and bulkheads (A1 to A16) show such limitations.

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Literature

[1] Report describing the test setup, charge geometry and damage by the Royal Netherlands Navy, to be issued.

[2] B. Bosman; Mechanical filter
Memorandum 95-CMC-M149, 1995

Table 1. Sensor locations

sen sor	sec tion	global position	x[mm]	y[mm]	z[mm]
S1	1	top deck, outside	3500	0	1550
S2	1	top deck, inside	3500	0	1525
S3	2	shell outside, on waterline	8000	-1550	0
S4	2	shell inside, on waterline	8000	-1525	0
S5	2	shell outside, near foundation	7900	-1110	-1120
S6	2	shell outside, near foundation	7900	-1110	-1120
S7	2	shell inside, near foundation	7900	-1090	-1100
S8	2	shell inside, near foundation	7900	-1090	-1100
S9	2	shell outside, near foundation	7900	-910	-1290
S10	2	shell outside, near foundation	7900	-910	-1290
S11	2	shell inside, near foundation	7900	-890	-1260
S12	2	shell inside, near foundation	7900	-890	-1260
S13	2	shell outside, between keel and foundation	7900	-480	-1500
S14	2	shell outside, between keel and foundation	7900	-480	-1500
S15	2	shell inside, between keel and foundation	7900	-470	-1470
S16	2	shell inside, between keel and foundation	7900	-470	-1470
S17	2	shell outside, keel	7900	0	-1550
S18	2	shell outside, keel	7900	0	-1550
S19	2	shell inside, keel	7900	0	-1525
S20	2	shell inside, keel	7900	0	-1525
S21	2	shell outside, near foundation	7900	1110	-1120
S22	2	shell outside, near foundation	7900	1110	-1120
S23	2	shell inside, near foundation	7900	1090	-1100
S24	2	shell inside, near foundation	7900	1090	-1100
S25	4	top deck, outside	13500	0	1550
S26	4	top deck, inside	13500	0	1525
A1	1	aft bulkhead, near keel	25	0	-1400
A2	1	aft bulkhead, near top deck	25	0	1400
A3	2	aft bulkhead engine room, near keel	6010	0	-1400
A4	2	aft bulkhead engine room, near keel	6010	0	-1400
A5	2	aft bulkhead engine room, near top deck	6010	-100	1400

sen sor	sec tion	global position	x[mm]	y[mm]	z[mm]
A6	2	aft bulkhead engine room, near top deck	6010	-100	1400
A7	2	shell, near foundation	8100	1120	-1050
A8	2	on the foundation	8100	1040	-1110
A9	2	shell, near foundation	8100	-1120	-1050
A10	2	on the foundation	8100	-1040	-1110
A11	2	fore bulkhead engine room, near keel	9990	0	-1400
A12	2	fore bulkhead engine room, near keel	9990	0	-1400
A13	2	fore bulkhead engine room, near top deck.	9990	0	1400
A14	2	fore bulkhead engine room, near top deck.	9990	0	1400
A15	4	fore bulkead, near keel	15975	0	-1205
A16	4	fore bulkead, near top deck	15975	0	1400
A17	2	floating deck	8090	900	-700
A18	2	floating deck	8090	900	-700
A19	2	dummy mass floating deck	8090	300	0
A20	2	top dummy mass floating deck	8090	0	725
A21	2	top dummy mass floating deck	8090	0	725
A22	2	floating deck	8090	-900	-700
A23	2	floating deck aft	6620	0	-700
A24	2	floating deck fore	9560	0	-700
R1	2	between shell and f.d.	8090	1375*	-675*
R2	2	between shell and f.d.	8090	1375*	-675*
R3	2	between shell and f.d.	8090	-1375*	-675*
R4	2	between shell and f.d.	8090	-1375*	-675*
P1	-	4.30 m. below waterline, SB	8000	-1550	-4300

* attachment point on the shell

Table 2. Presented figures for shot 1

Sensor	SHOT 1 figure number (presented time in ms)							SRS
	20-25	20-40	10-100	0-200	0-300	0-500	0-1000	1-1000 Hz
P	2	-	-	-	-	-	3	-
S1	-	1A26	-	-	1A1	-	-	-
S2	-	1A27	-	-	1A2	-	-	-
S3	-	1A28	-	-	1A3	-	-	-
S4	-	1A29	-	-	1A4	-	-	-
S5	-	1A30	-	-	1A5	-	-	-
S6	-	1A31	-	-	1A6	-	-	-
S7	-	1A32	-	-	1A7	-	-	-
S8	-	1A33	-	-	1A8	-	-	-
S10	-	1A34	-	-	1A9	-	-	-
S11	-	1A35	-	-	1A10	-	-	-
S12	-	1A36	-	-	1A11	-	-	-
S13	-	1A37	-	-	1A12	-	-	-
S14	-	1A38	-	-	1A13	-	-	-
S15	-	1A39	-	-	1A14	-	-	-
S16	-	1A40	-	-	1A15	-	-	-
S17	-	1A41	-	-	1A16	-	-	-
S18	-	1A42	-	-	1A17	-	-	-
S19	-	1A43	-	-	1A18	-	-	-
S20	-	1A44	-	-	1A19	-	-	-
S21	-	1A45	-	-	1A20	-	-	-
S22	-	1A46	-	-	1A21	-	-	-
S23	-	1A47	-	-	1A22	-	-	-
S24	-	1A48	-	-	1A23	-	-	-
S25	-	1A49	-	-	1A24	-	-	-
S26	-	1A50	-	-	1A25	-	-	-
A1	-	-	-	1B9	-	-	-	1B81
A2	-	-	-	1B10	-	-	-	1B82
A3	-	-	-	1B11	-	-	-	1B83
A4	-	-	-	1B12	-	-	-	1B84
A5	-	-	-	1B13	-	-	-	1B85

Sensor	SHOT 1 figure number (presented time in ms)							SRS 1-1000 Hz
	20-25	20-40	10-100	0-200	0-300	0-500	0-1000	
A6	-	-	-	1B14	-	-	-	1B86
A7	-	-	-	1B15	-	-	-	1B87
A8	-	-	-	1B16	-	-	-	1B88
A9	-	-	-	1B17 1B105	-	-	-	1B89
A10	-	-	-	1B18	-	-	-	1B90
A11	-	-	-	1B19	-	-	-	1B91
A12	-	-	-	1B20 1B106	-	-	-	1B92
A13	-	-	-	1B21	-	-	-	1B93
A14	-	-	-	1B22	-	-	-	1B94
A15	-	-	-	1B23	-	-	-	1B95
A16	-	-	-	1B24	-	-	-	1B96
A17	-	-	-	-	-	-	1B25	1B97
A18	-	-	-	-	-	-	1B26	1B98
A19	-	-	-	-	-	-	1B27	1B99
A20	-	-	-	-	-	-	1B28	1B100
A21	-	-	-	-	-	-	1B29	1B101
A22	-	-	-	-	-	-	1B30	1B102
A23	-	-	-	-	-	-	1B31	1B103
A24	-	-	-	-	-	-	1B32	1B104
vel. A1	-	-	1B33	-	-	-	-	-
vel. A2	-	-	1B34	-	-	-	-	-
vel. A3	-	-	1B35	-	-	-	-	-
vel. A4	-	-	1B36	-	-	-	-	-
vel. A5	-	-	1B37	-	-	-	-	-
vel. A6	-	-	1B38	-	-	-	-	-
vel. A7	-	-	1B39	-	-	-	-	-
vel. A8	-	-	1B40	-	-	-	-	-
vel. A9	-	-	1B41 1B107	-	-	-	-	-
vel. A10	-	-	1B42	-	-	-	-	-
vel. A11	-	-	1B43	-	-	-	-	-

Sensor	SHOT 1 figure number (presented time in ms)							SRS
	20-25	20-40	10-100	0-200	0-300	0-500	0-1000	1-1000 Hz
vel. A12	-	-	1B44 1B108	-	-	-	-	-
vel. A13	-	-	1B45	-	-	-	-	-
vel. A14	-	-	1B46	-	-	-	-	-
vel. A15	-	-	1B47	-	-	-	-	-
vel. A16	-	-	1B48	-	-	-	-	-
vel. A17	-	-	-	-	-	1B49	-	-
vel. A18	-	-	-	-	-	1B50	-	-
vel. A19	-	-	-	-	-	1B51	-	-
vel. A20	-	-	-	-	-	1B52	-	-
vel. A21	-	-	-	-	-	1B53	-	-
vel. A22	-	-	-	-	-	1B54	-	-
vel. A23	-	-	-	-	-	1B55	-	-
vel. A24	-	-	-	-	-	1B56	-	-
displ. A1	-	-	1B57	-	-	-	-	-
displ. A2	-	-	1B58	-	-	-	-	-
displ. A3	-	-	1B59	-	-	-	-	-
displ. A4	-	-	1B60	-	-	-	-	-
displ. A5	-	-	1B61	-	-	-	-	-
displ. A6	-	-	1B62	-	-	-	-	-
displ. A7	-	-	1B63	-	-	-	-	-
displ. A8	-	-	1B64	-	-	-	-	-
displ. A9	-	-	1B65 1B109	-	-	-	-	-
displ. A10	-	-	1B66	-	-	-	-	-
displ. A11	-	-	1B67	-	-	-	-	-
displ. A12	-	-	1B68 1B110	-	-	-	-	-
displ. A13	-	-	1B69	-	-	-	-	-
displ. A14	-	-	1B70	-	-	-	-	-
displ. A15	-	-	1B71	-	-	-	-	-
displ. A16	-	-	1B72	-	-	-	-	-
displ. A17	-	-	-	-	-	1B73	-	-
displ. A18	-	-	-	-	-	1B74	-	-

Sensor	SHOT 1 figure number (presented time in ms)							SRS 1-1000 Hz
	20-25	20-40	10-100	0-200	0-300	0-500	0-1000	
displ. A19	-	-	-	-	-	1B75	-	-
displ. A20	-	-	-	-	-	1B76	-	-
displ. A21	-	-	-	-	-	1B77	-	-
displ. A22	-	-	-	-	-	1B78	-	-
displ. A23	-	-	-	-	-	1B79	-	-
displ. A24	-	-	-	-	-	1B80	-	-
rel.displ. R1	-	-	-	-	1B5	-	1B1	-
rel.displ. R2	-	-	-	-	1B6	-	1B2	-
rel.displ. R3	-	-	-	-	1B7	-	1B3	-
rel.displ. R4	-	-	-	-	1B8	-	1B4	-

Table 3. Presented figures for shot 2

Sensor	SHOT 2 figure number (presented time in ms)								SRS 1-1000 Hz
	17-27	18-38	10-100	0-200	0-300	0-500	0-1000	0-1400	
P	4	-	-	-	-	-	5	-	-
S1	-	2A26	-	-	2A1	-	-	-	-
S2	-	2A27	-	-	2A2	-	-	-	-
S3	-	2A28	-	-	2A3	-	-	-	-
S4	-	2A29	-	-	2A4	-	-	-	-
S5	-	2A30	-	-	2A5	-	-	-	-
S6	-	2A31	-	-	2A6	-	-	-	-
S7	-	2A32	-	-	2A7	-	-	-	-
S8	-	2A33	-	-	2A8	-	-	-	-
S10	-	2A34	-	-	2A9	-	-	-	-
S11	-	2A35	-	-	2A10	-	-	-	-
S12	-	2A36	-	-	2A11	-	-	-	-
S13	-	2A37	-	-	2A12	-	-	-	-
S14	-	2A38	-	-	2A13	-	-	-	-
S15	-	2A39	-	-	2A14	-	-	-	-
S16	-	2A40	-	-	2A15	-	-	-	-
S17	-	2A41	-	-	2A16	-	-	-	-
S18	-	2A42	-	-	2A17	-	-	-	-
S19	-	2A43	-	-	2A18	-	-	-	-
S20	-	2A44	-	-	2A19	-	-	-	-
S21	-	2A45	-	-	2A20	-	-	-	-
S22	-	2A46	-	-	2A21	-	-	-	-
S23	-	2A47	-	-	2A22	-	-	-	-
S24	-	2A48	-	-	2A23	-	-	-	-
S25	-	2A49	-	-	2A24	-	-	-	-
S26	-	2A50	-	-	2A25	-	-	-	-
A1	-	-	-	2B9	-	-	-	-	2B81
A2	-	-	-	2B10	-	-	-	-	2B82
A3	-	-	-	2B11	-	-	-	-	2B83
A4	-	-	-	2B12	-	-	-	-	2B84
A5	-	-	-	2B13	-	-	-	-	2B85

Sensor	SHOT 2 figure number (presented time in ms)								SRS 1-1000 Hz
	17-27	18-38	10-100	0-200	0-300	0-500	0-1000	0-1400	
A6	-	-	-	2B14	-	-	-	-	2B86
A7	-	-	-	2B15	-	-	-	-	2B87
A8	-	-	-	2B16	-	-	-	-	2B88
A9	-	-	-	2B17	-	-	-	-	2B89
A10	-	-	-	2B18	-	-	-	-	2B90
A11	-	-	-	2B19	-	-	-	-	2B91
A12	-	-	-	2B20	-	-	-	-	2B92
A13	-	-	-	2B21	-	-	-	-	2B93
A14	-	-	-	2B22	-	-	-	-	2B94
A15	-	-	-	2B23	-	-	-	-	2B95
A16	-	-	-	2B24	-	-	-	-	2B96
A17	-	-	-	-	-	-	2B25	-	2B97
A18	-	-	-	-	-	-	2B26	-	2B98
A19	-	-	-	-	-	-	2B27	-	2B99
A20	-	-	-	-	-	-	2B28	-	2B100
A21	-	-	-	-	-	-	2B29	-	2B101
A22	-	-	-	-	-	-	2B30	-	2B102
A23	-	-	-	-	-	-	2B31	-	2B103
A24	-	-	-	-	-	-	2B32	-	2B104
vel. A1	-	-	2B33	-	-	-	-	-	-
vel. A2	-	-	2B34	-	-	-	-	-	-
vel. A3	-	-	2B35	-	-	-	-	-	-
vel. A4	-	-	2B36	-	-	-	-	-	-
vel. A5	-	-	2B37	-	-	-	-	-	-
vel. A6	-	-	2B38	-	-	-	-	-	-
vel. A7	-	-	2B39	-	-	-	-	-	-
vel. A8	-	-	2B40	-	-	-	-	-	-
vel. A9	-	-	2B41	-	-	-	-	-	-
vel. A10	-	-	2B42	-	-	-	-	-	-
vel. A11	-	-	2B43	-	-	-	-	-	-
vel. A12	-	-	2B44	-	-	-	-	-	-
vel. A13	-	-	2B45	-	-	-	-	-	-

Sensor	SHOT 2 figure number (presented time in ms)								SRS 1-1000 Hz
	17-27	18-38	10-100	0-200	0-300	0-500	0-1000	0-1400	
vel. A14	-	-	2B46	-	-	-	-	-	-
vel. A15	-	-	2B47	-	-	-	-	-	-
vel. A16	-	-	2B48	-	-	-	-	-	-
vel. A17	-	-	-	-	-	2B49	-	-	-
vel. A18	-	-	-	-	-	2B50	-	-	-
vel. A19	-	-	-	-	-	2B51	-	-	-
vel. A20	-	-	-	-	-	2B52	-	-	-
vel. A21	-	-	-	-	-	2B53	-	-	-
vel. A22	-	-	-	-	-	2B54	-	-	-
vel. A23	-	-	-	-	-	2B55	-	-	-
vel. A24	-	-	-	-	-	2B56	-	-	-
displ. A1	-	-	2B57	-	-	-	-	-	-
displ. A2	-	-	2B58	-	-	-	-	-	-
displ. A3	-	-	2B59	-	-	-	-	-	-
displ. A4	-	-	2B60	-	-	-	-	-	-
displ. A5	-	-	2B61	-	-	-	-	-	-
displ. A6	-	-	2B62	-	-	-	-	-	-
displ. A7	-	-	2B63	-	-	-	-	-	-
displ. A8	-	-	2B64	-	-	-	-	-	-
displ. A9	-	-	2B65	-	-	-	-	-	-
displ. A10	-	-	2B66	-	-	-	-	-	-
displ. A11	-	-	2B67	-	-	-	-	-	-
displ. A12	-	-	2B68	-	-	-	-	-	-
displ. A13	-	-	2B69	-	-	-	-	-	-
displ. A14	-	-	2B70	-	-	-	-	-	-
displ. A15	-	-	2B71	-	-	-	-	-	-
displ. A16	-	-	2B72	-	-	-	-	-	-
displ. A17	-	-	-	-	-	2B73	-	-	-
displ. A18	-	-	-	-	-	2B74	-	-	-
displ. A19	-	-	-	-	-	2B75	-	-	-
displ. A20	-	-	-	-	-	2B76	-	-	-
displ. A21	-	-	-	-	-	2B77	-	-	-

Sensor	SHOT 2 figure number (presented time in ms)								SRS 1-1000 Hz
	17-27	18-38	10-100	0-200	0-300	0-500	0-1000	0-1400	
displ. A22	-	-	-	-	-	2B78	-	-	-
displ. A23	-	-	-	-	-	2B79	-	-	-
displ. A24	-	-	-	-	-	2B80	-	-	-
rel.displ. R1	-	-	-	-	2B5	-	-	2B1	-
rel.displ. R2	-	-	-	-	2B6	-	-	2B2	-
rel.displ. R3	-	-	-	-	2B7	-	-	2B3	-
rel.displ. R4	-	-	-	-	2B8	-	-	2B4	-

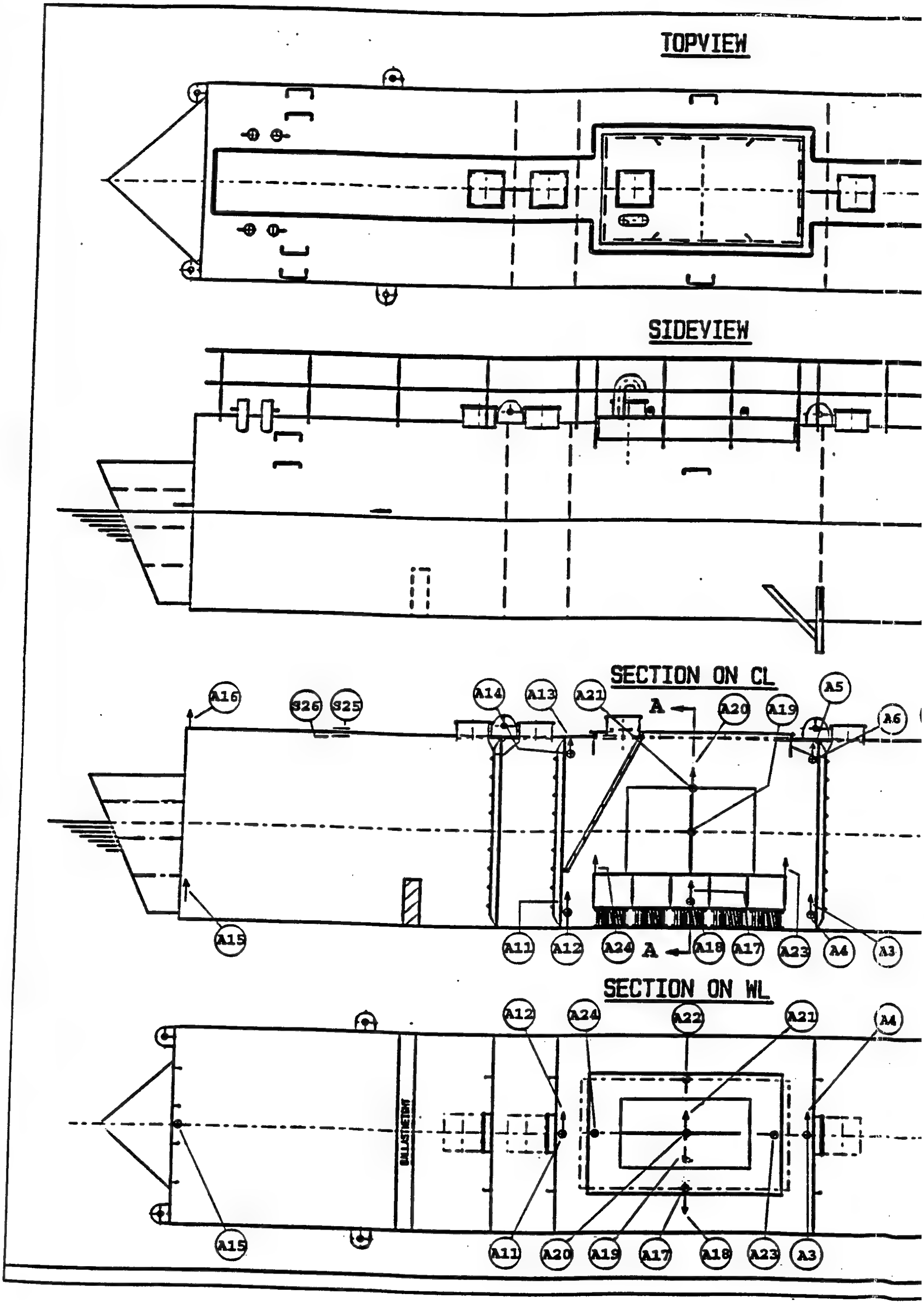
Table 4. Presented figures for shot 3

Sensor	SHOT 3 figure number (presented time in ms)									SRS
	18-28	20-40	10-100	0-240	0-300	0-500	0-1400	0-1600	0-1800	1-1000 Hz
P	6	-	-	-	-	-	7	-	-	-
S1	-	3A26	-	-	3A1	-	-	-	-	-
S2	-	3A27	-	-	3A2	-	-	-	-	-
S3	-	3A28	-	-	3A3	-	-	-	-	-
S4	-	3A29	-	-	3A4	-	-	-	-	-
S5	-	3A30	-	-	3A5	-	-	-	-	-
S6	-	3A31	-	-	3A6	-	-	-	-	-
S7	-	3A32	-	-	3A7	-	-	-	-	-
S8	-	3A33	-	-	3A8	-	-	-	-	-
S10	-	3A34	-	-	3A9	-	-	-	-	-
S11	-	3A35	-	-	3A10	-	-	-	-	-
S12	-	3A36	-	-	3A11	-	-	-	-	-
S13	-	3A37	-	-	3A12	-	-	-	-	-
S14	-	3A38	-	-	3A13	-	-	-	-	-
S15	-	3A39	-	-	3A14	-	-	-	-	-
S16	-	3A40	-	-	3A15	-	-	-	-	-
S17	-	3A41	-	-	3A16	-	-	-	-	-
S18	-	3A42	-	-	3A17	-	-	-	-	-
S19	-	3A43	-	-	3A18	-	-	-	-	-
S20	-	3A44	-	-	3A19	-	-	-	-	-
S21	-	3A45	-	-	3A20	-	-	-	-	-
S22	-	3A46	-	-	3A21	-	-	-	-	-
S23	-	3A47	-	-	3A22	-	-	-	-	-
S24	-	3A48	-	-	3A23	-	-	-	-	-
S25	-	3A49	-	-	3A24	-	-	-	-	-
S26	-	3A50	-	-	3A25	-	-	-	-	-
A1	-	-	-	3B9	-	-	-	-	-	3B81
A2	-	-	-	3B10	-	-	-	-	-	3B82
A3	-	-	-	3B11	-	-	-	-	-	3B83
A4	-	-	-	3B12	-	-	-	-	-	3B84
A5	-	-	-	3B13	-	-	-	-	-	3B85

Sensor	SHOT 3 figure number (presented time in ms)									SRS 1-1000 Hz
	18-28	20-40	10-100	0-240	0-300	0-500	0-1400	0-1600	0-1800	
A6	-	-	-	3B14	-	-	-	-	-	3B86
A7	-	-	-	3B15	-	-	-	-	-	3B87
A8	-	-	-	3B16	-	-	-	-	-	3B88
A9	-	-	-	3B17	-	-	-	-	-	3B89
A10	-	-	-	3B18	-	-	-	-	-	3B90
A11	-	-	-	3B19	-	-	-	-	-	-
A12	-	-	-	3B20	-	-	-	-	-	3B91
A13	-	-	-	3B21	-	-	-	-	-	3B92
A14	-	-	-	3B22	-	-	-	-	-	3B93
A15	-	-	-	3B23	-	-	-	-	-	3B94
A16	-	-	-	3B24	-	-	-	-	-	3B95
A17	-	-	-	-	-	-	-	3B25	-	3B96
A18	-	-	-	-	-	-	-	3B26	-	3B97
A19	-	-	-	-	-	-	-	3B27	-	3B98
A20	-	-	-	-	-	-	-	3B28	-	3B99
A21	-	-	-	-	-	-	-	3B29	-	3B100
A22	-	-	-	-	-	-	-	3B30	-	3B101
A23	-	-	-	-	-	-	-	3B31	-	3B102
A24	-	-	-	-	-	-	-	3B32	-	3B103
vel. A1	-	-	3B33	-	-	-	-	-	-	-
vel. A2	-	-	3B34	-	-	-	-	-	-	-
vel. A3	-	-	3B35	-	-	-	-	-	-	-
vel. A4	-	-	3B36	-	-	-	-	-	-	-
vel. A5	-	-	3B37	-	-	-	-	-	-	-
vel. A6	-	-	3B38	-	-	-	-	-	-	-
vel. A7	-	-	3B39	-	-	-	-	-	-	-
vel. A8	-	-	3B40	-	-	-	-	-	-	-
vel. A9	-	-	3B41	-	-	-	-	-	-	-
vel. A10	-	-	3B42	-	-	-	-	-	-	-
vel. A11	-	-	3B43	-	-	-	-	-	-	-
vel. A12	-	-	3B44	-	-	-	-	-	-	-
vel. A13	-	-	3B45	-	-	-	-	-	-	-

Sensor	SHOT 3 figure number (presented time in ms)									SRS 1-1000 Hz
	18-28	20-40	10-100	0-240	0-300	0-500	0-1400	0-1600	0-1800	
vel. A14	-	-	3B46	-	-	-	-	-	-	-
vel. A15	-	-	3B47	-	-	-	-	-	-	-
vel. A16	-	-	3B48	-	-	-	-	-	-	-
vel. A17	-	-	-	-	-	3B49	-	-	-	-
vel. A18	-	-	-	-	-	3B50	-	-	-	-
vel. A19	-	-	-	-	-	3B51	-	-	-	-
vel. A20	-	-	-	-	-	3B52	-	-	-	-
vel. A21	-	-	-	-	-	3B53	-	-	-	-
vel. A22	-	-	-	-	-	3B54	-	-	-	-
vel. A23	-	-	-	-	-	3B55	-	-	-	-
vel. A24	-	-	-	-	-	3B56	-	-	-	-
displ. A1	-	-	3B57	-	-	-	-	-	-	-
displ. A2	-	-	3B58	-	-	-	-	-	-	-
displ. A3	-	-	3B59	-	-	-	-	-	-	-
displ. A4	-	-	3B60	-	-	-	-	-	-	-
displ. A5	-	-	3B61	-	-	-	-	-	-	-
displ. A6	-	-	3B62	-	-	-	-	-	-	-
displ. A7	-	-	3B63	-	-	-	-	-	-	-
displ. A8	-	-	3B64	-	-	-	-	-	-	-
displ. A9	-	-	3B65	-	-	-	-	-	-	-
displ. A10	-	-	3B66	-	-	-	-	-	-	-
displ. A11	-	-	3B67	-	-	-	-	-	-	-
displ. A12	-	-	3B68	-	-	-	-	-	-	-
displ. A13	-	-	3B69	-	-	-	-	-	-	-
displ. A14	-	-	3B70	-	-	-	-	-	-	-
displ. A15	-	-	3B71	-	-	-	-	-	-	-
displ. A16	-	-	3B72	-	-	-	-	-	-	-
displ. A17	-	-	-	-	-	3B73	-	-	-	-
displ. A18	-	-	-	-	-	3B74	-	-	-	-
displ. A19	-	-	-	-	-	3B75	-	-	-	-
displ. A20	-	-	-	-	-	3B76	-	-	-	-
displ. A21	-	-	-	-	-	3B77	-	-	-	-

Sensor	SHOT 3 figure number (presented time in ms)									SRS 1-1000 Hz
	18-28	20-40	10-100	0-240	0-300	0-500	0-1400	0-1600	0-1800	
displ. A22	-	-	-	-	-	3B78	-	-	-	-
displ. A23	-	-	-	-	-	3B79	-	-	-	-
displ. A24	-	-	-	-	-	3B80	-	-	-	-
rel.displ. R1	-	-	-	-	3B5	-	-	-	3B1	-
rel.displ. R2	-	-	-	-	3B6	-	-	-	3B2	-
rel.displ. R3	-	-	-	-	3B7	-	-	-	3B3	-
rel.displ. R4	-	-	-	-	3B8	-	-	-	3B4	-


TOPVIEW
SIDEVIEW
SECTION ON CL
A16
S26
S25
A14
A13
A21
A
A20
A19
A5
A6
A15
A11
A12
A24
A
A18
A17
A23
A4
A3
SECTION ON WL
A12
A24
A22
A21
A4
A15
A11
A20
A19
A17
A18
A23
A3

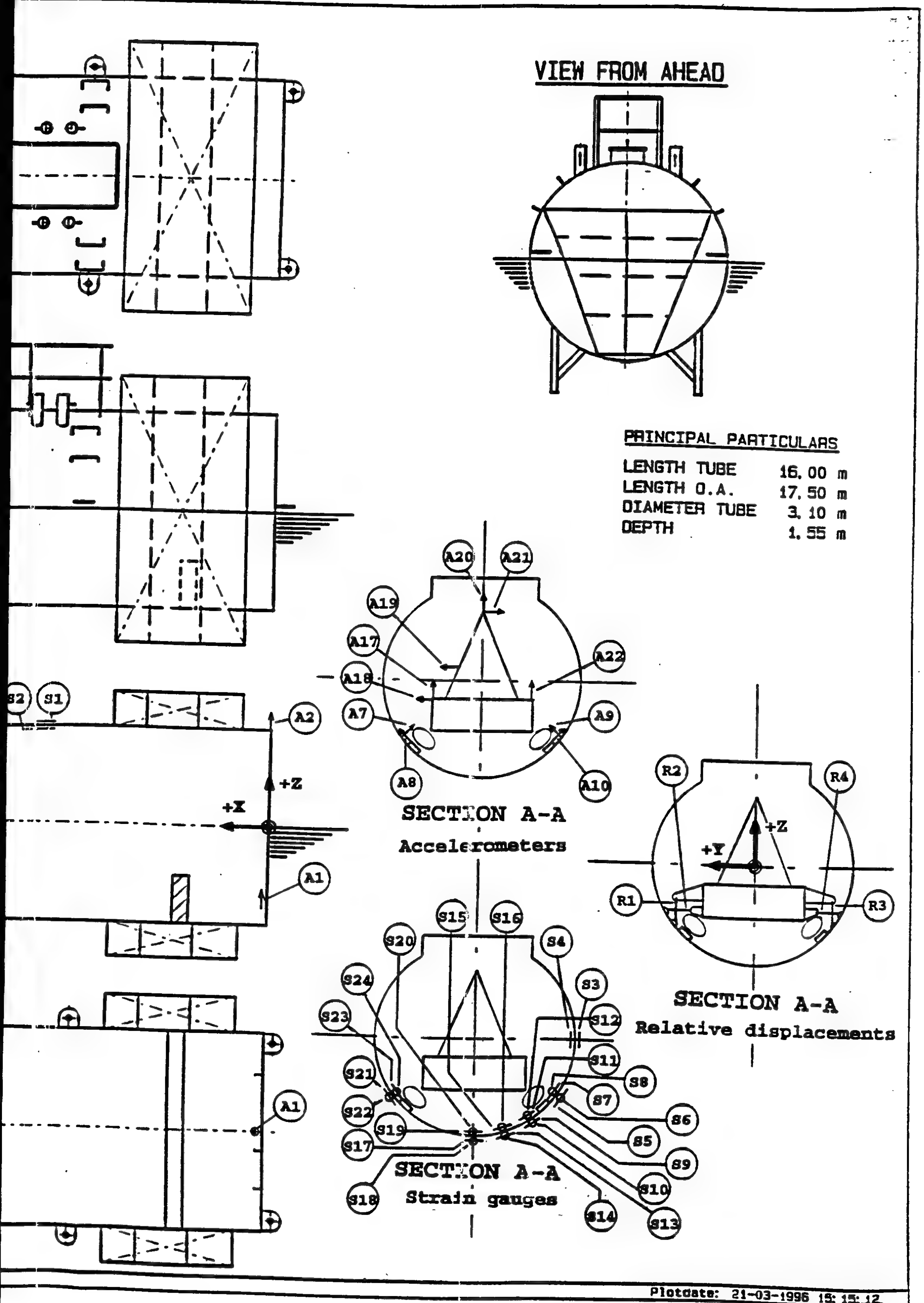

VIEW FROM AHEAD
PRINCIPAL PARTICULARS
LENGTH TUBE 16.00 m
LENGTH O.A. 17.50 m
DIAMETER TUBE 3.10 m
DEPTH 1.55 m
SECTION A-A
Accelerometers
A1
A2
A7
A8
A9
A10
A17
A18
A19
A20
A21
A22
+Z
+X
S1
S2
SECTION A-A
Relative displacements
R1
R2
R3
R4
+Z
+Y
SECTION A-A
Strain gauges
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
S14
S15
S16
S17
S18
S19
S20
S21
S22
S23
S24
Plotdate: 21-03-1996 15:15:12

FIG. 1

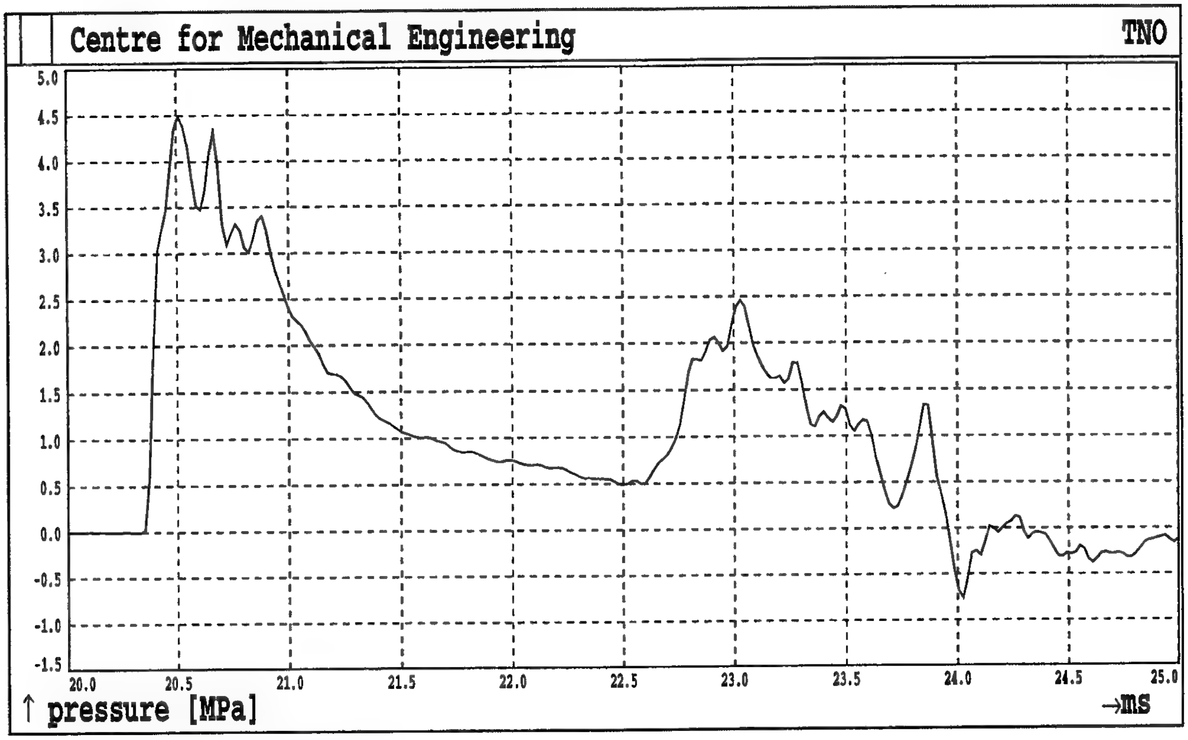


Fig.2. Shot 1 Sensor P

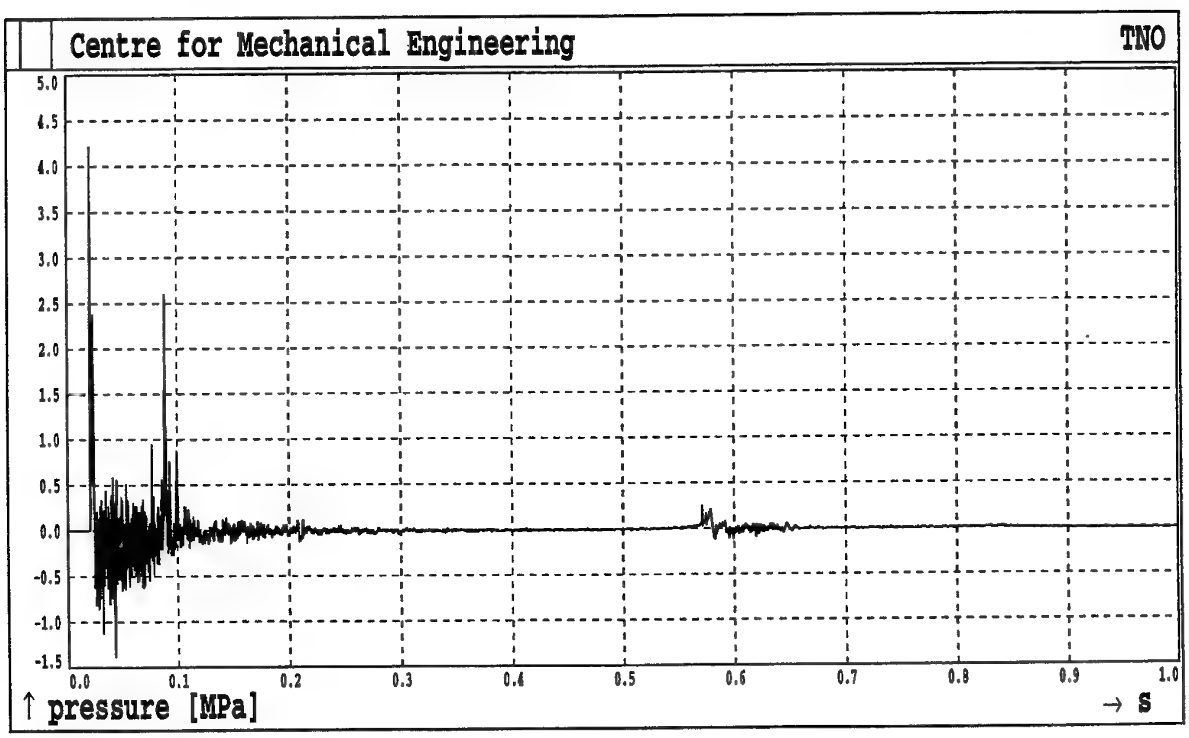


Fig.3. Shot 1 Sensor P

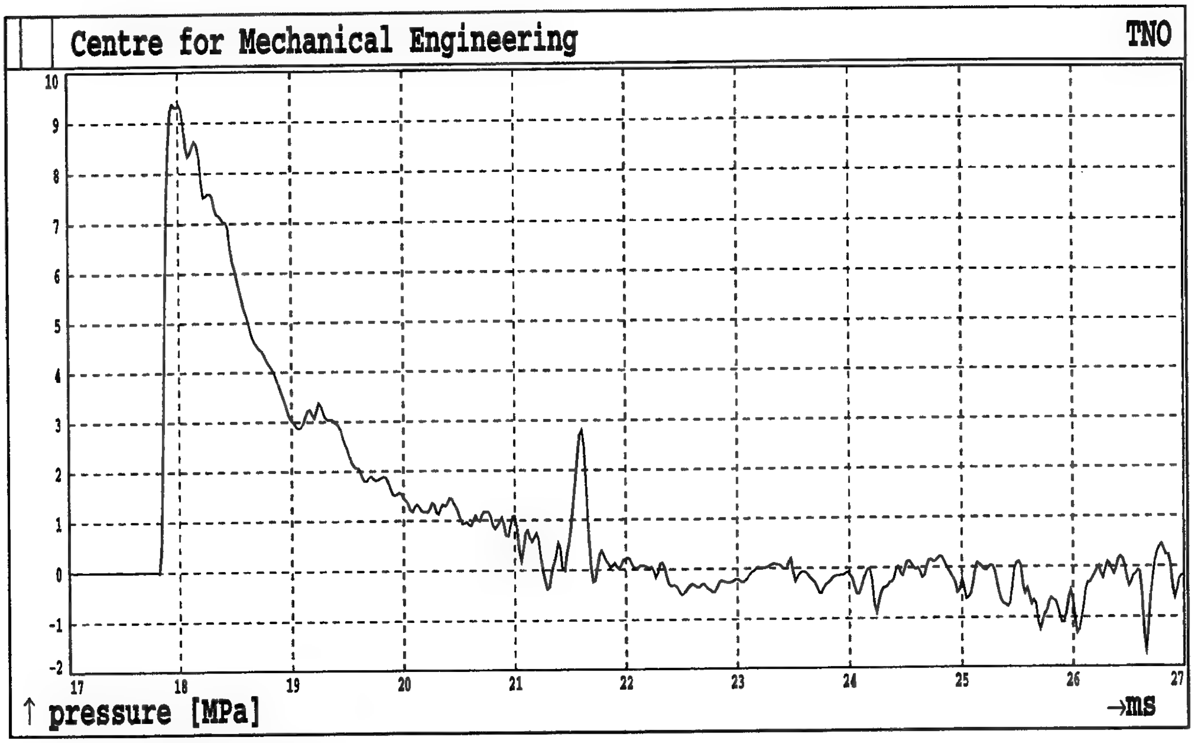


Fig.4. Shot 2 Sensor P

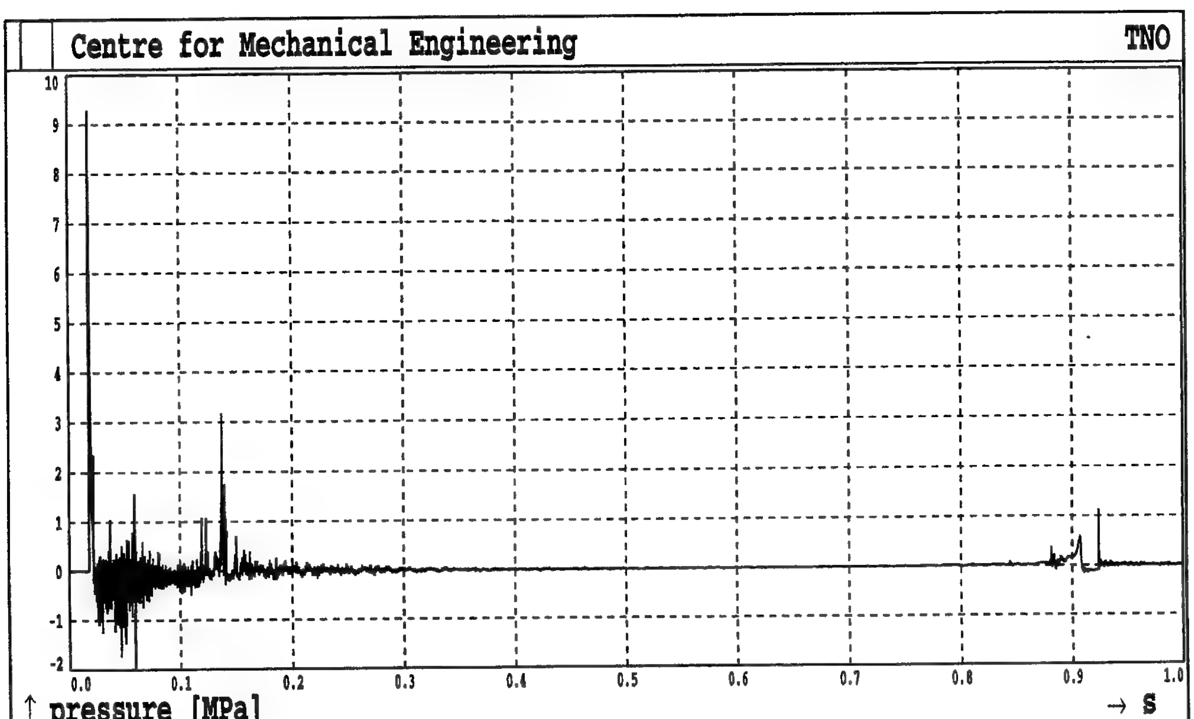


Fig.5. Shot 2 Sensor P

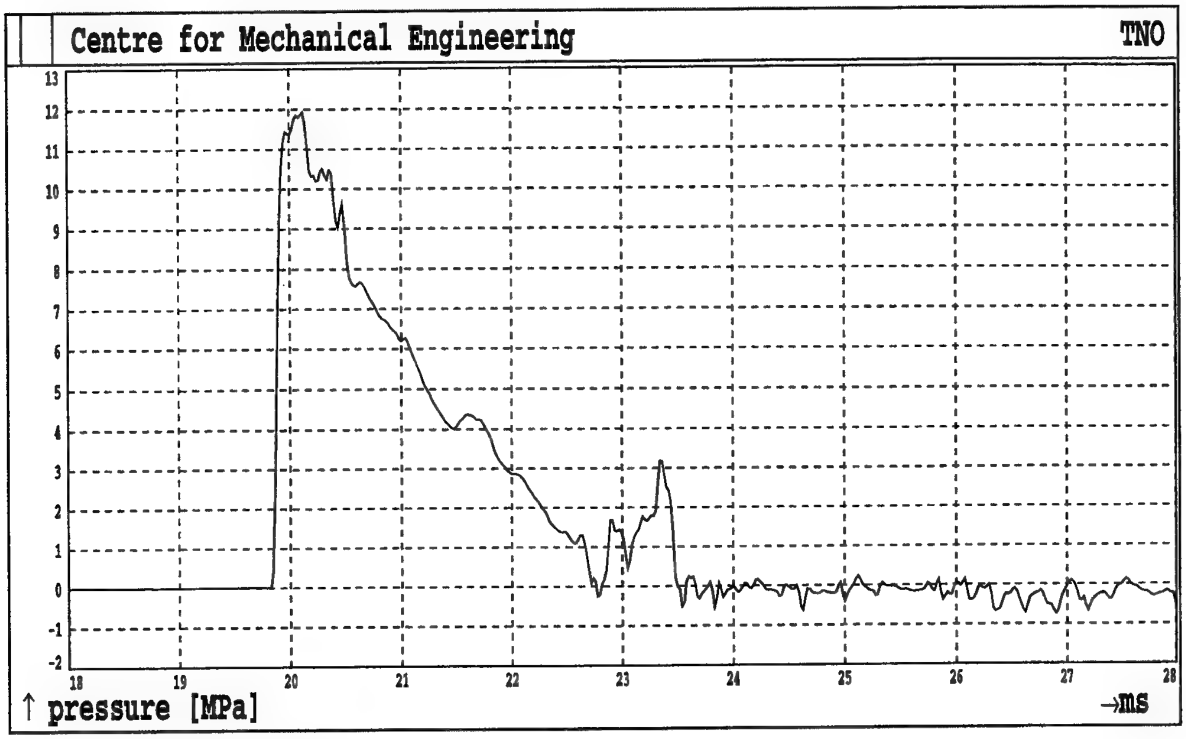


Fig.6. Shot 3 Sensor P

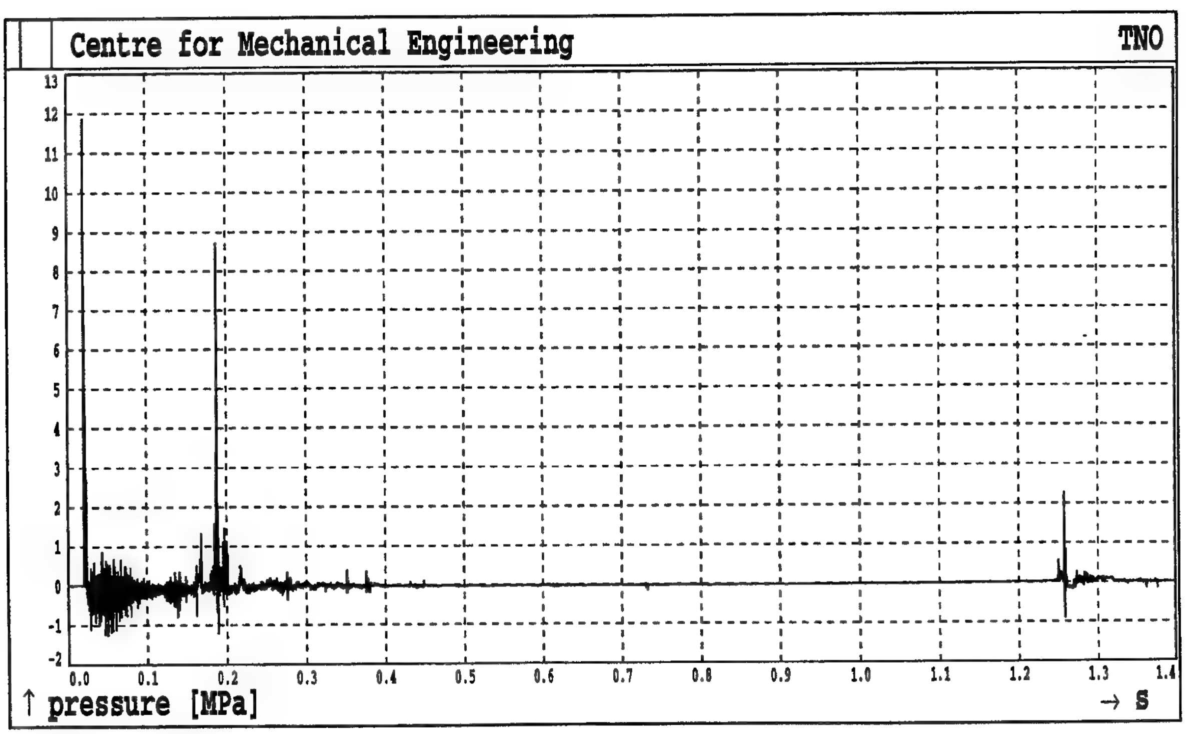


Fig.7. Shot 3 Sensor P

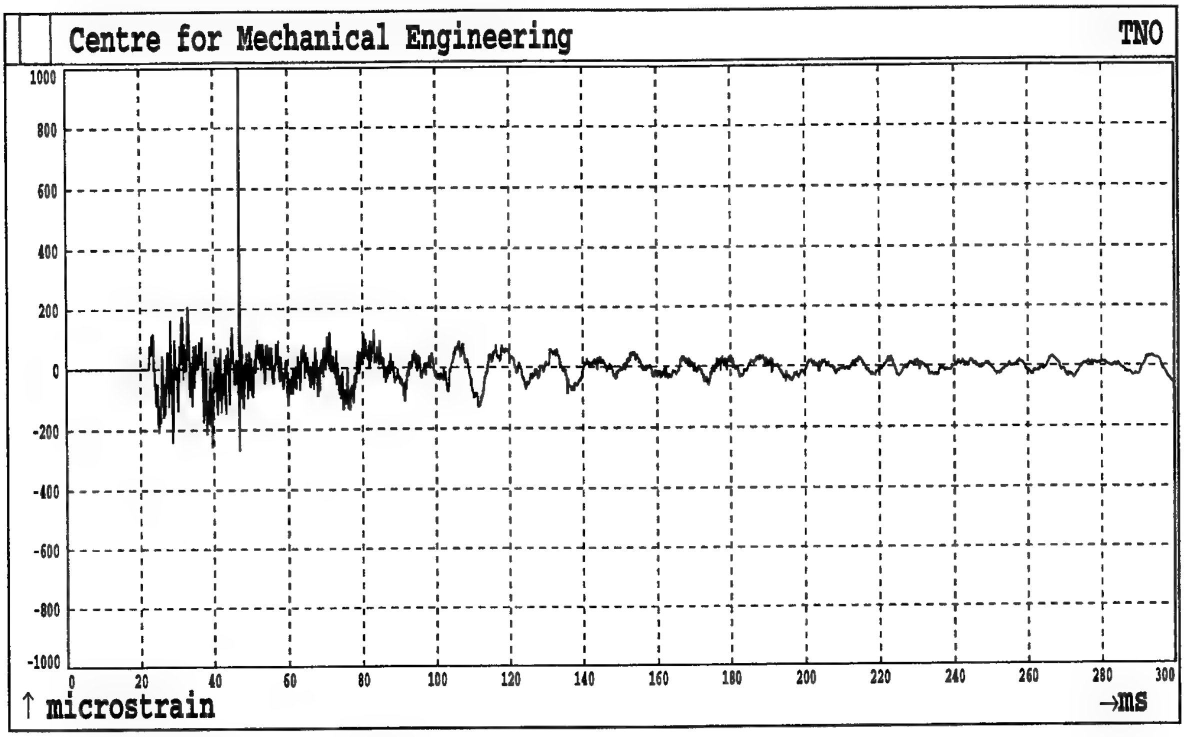


Fig.1A1. Shot 1 Sensor S1

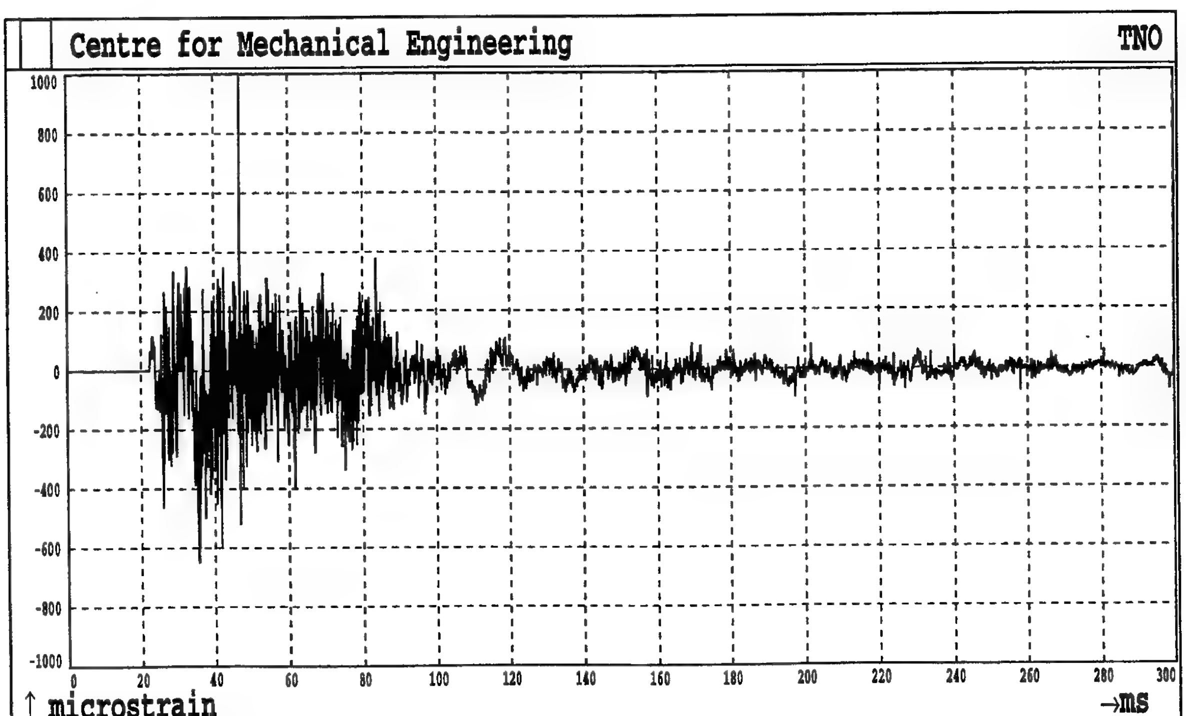


Fig.1A2. Shot 1 Sensor S2

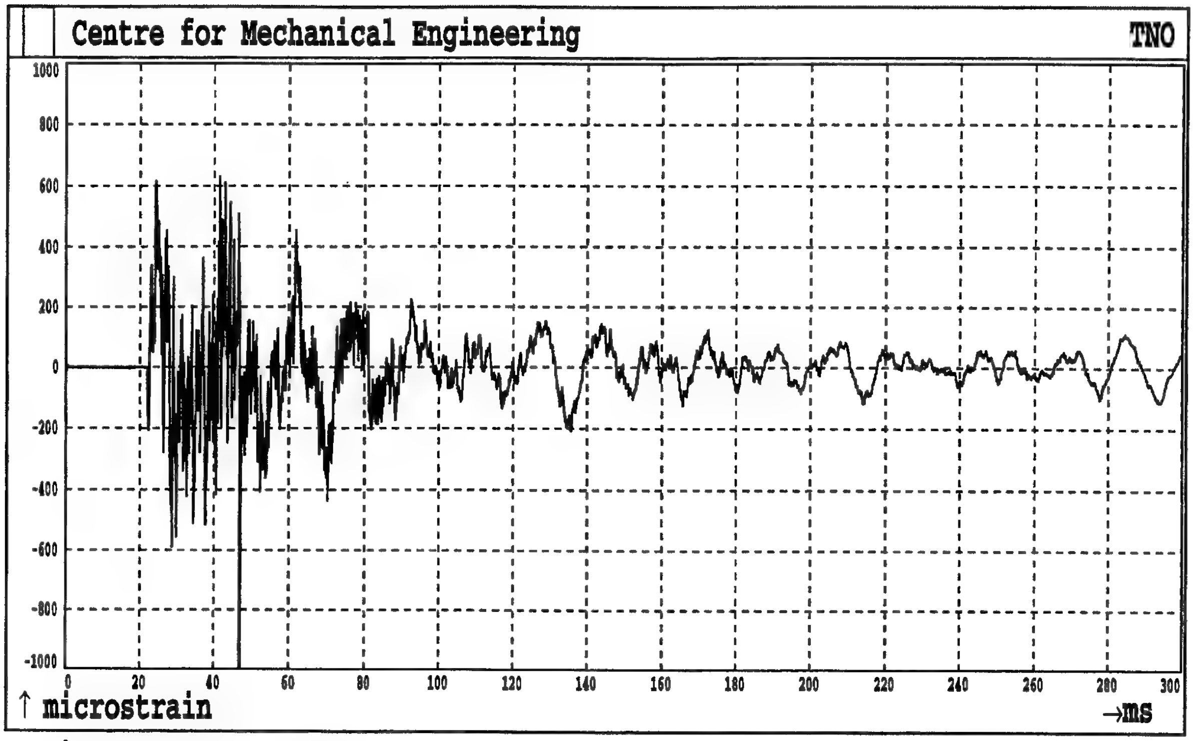


Fig.1A3. Shot 1 Sensor S3

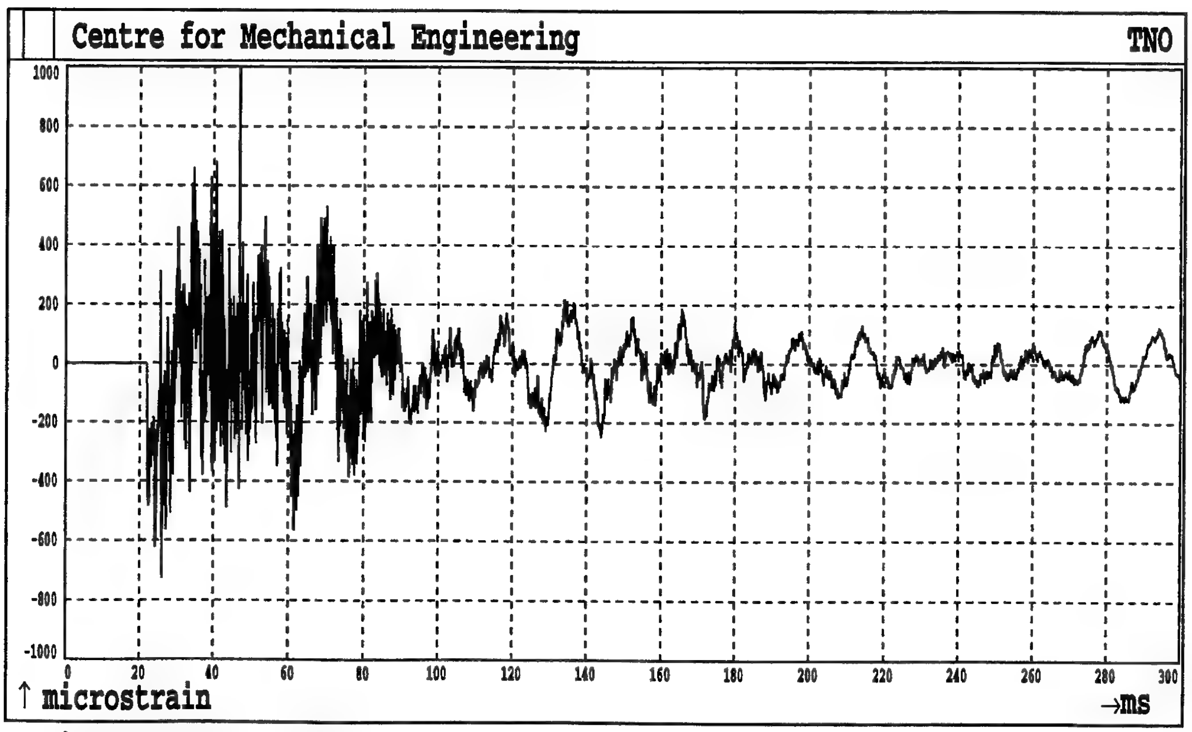


Fig.1A4. Shot 1 Sensor S4

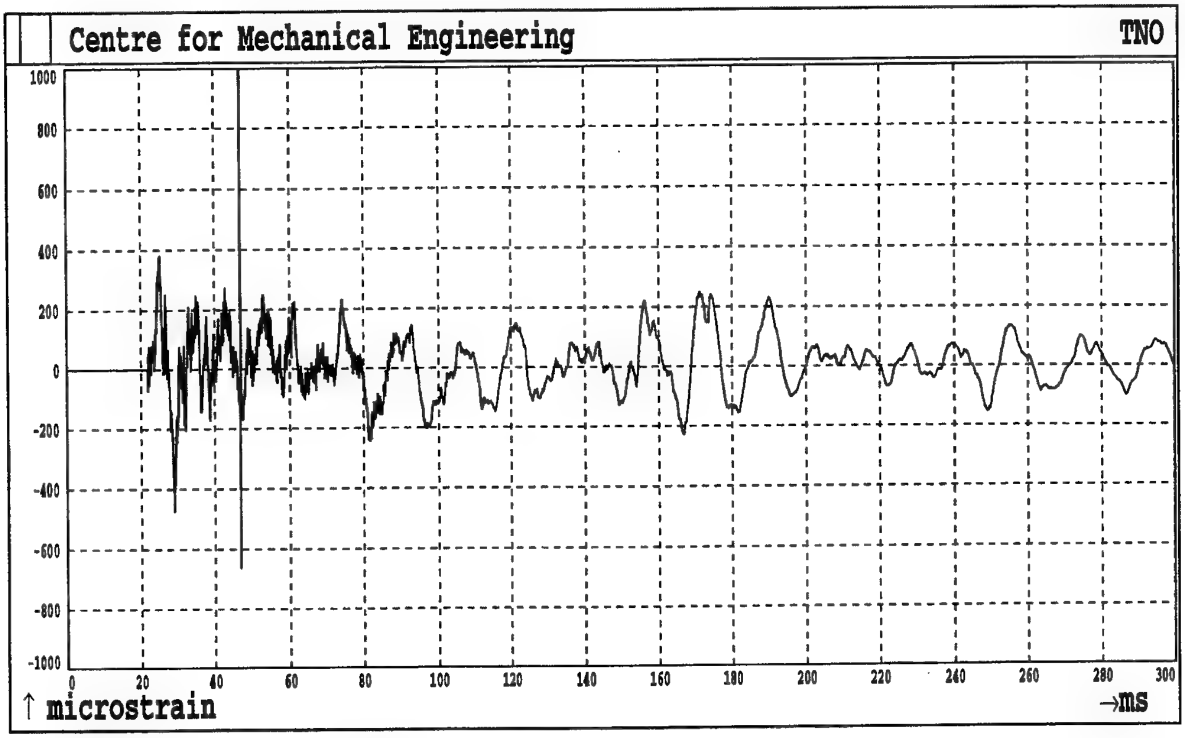


Fig.1A5. Shot 1 Sensor S5

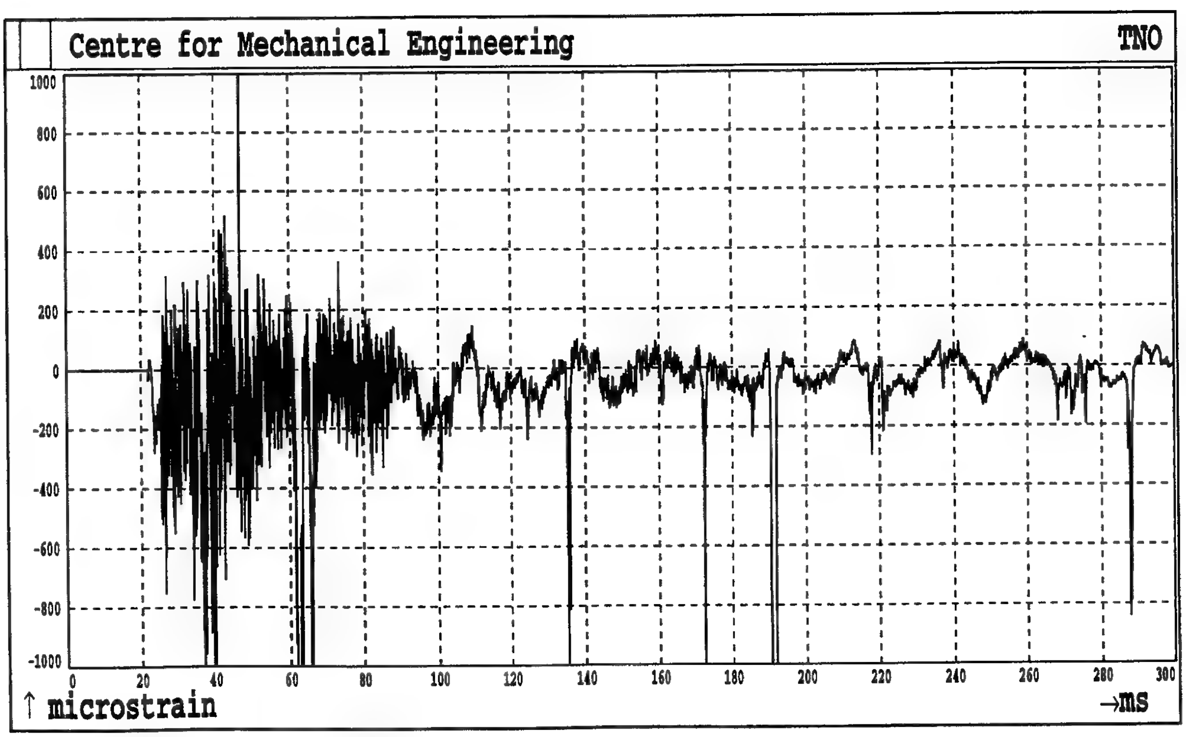


Fig.1A6. Shot 1 Sensor S6

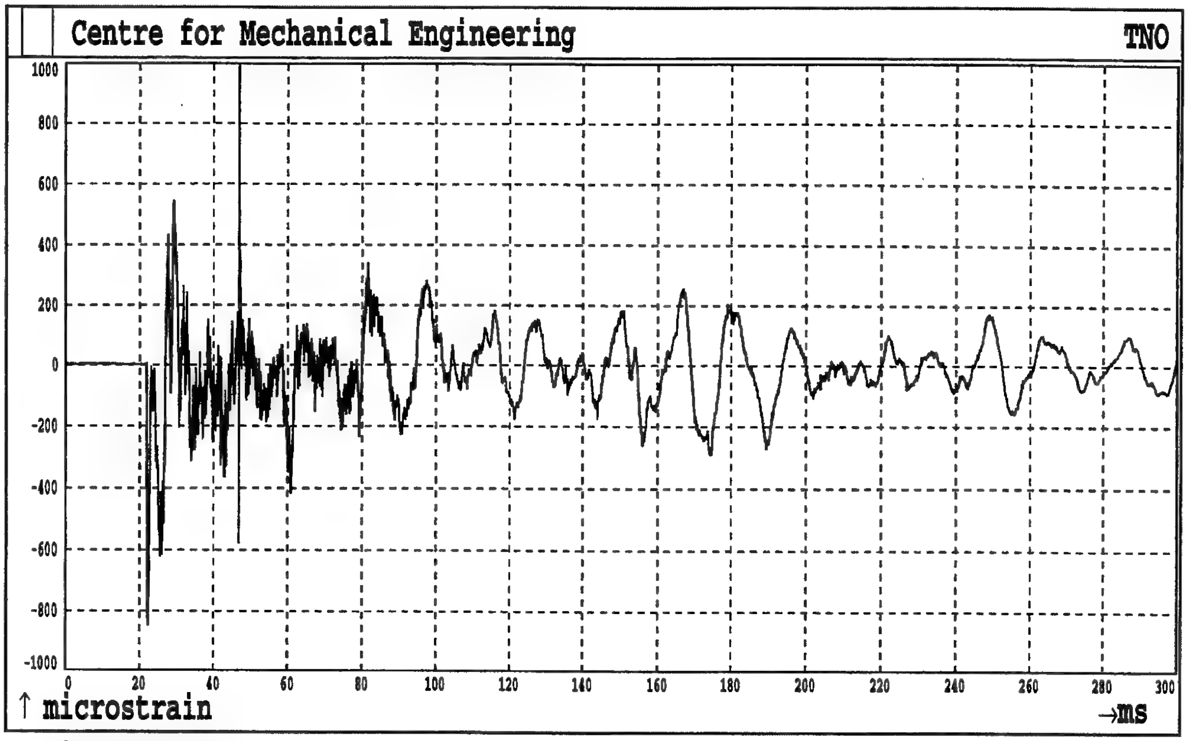


Fig.1A7. Shot 1 Sensor S7

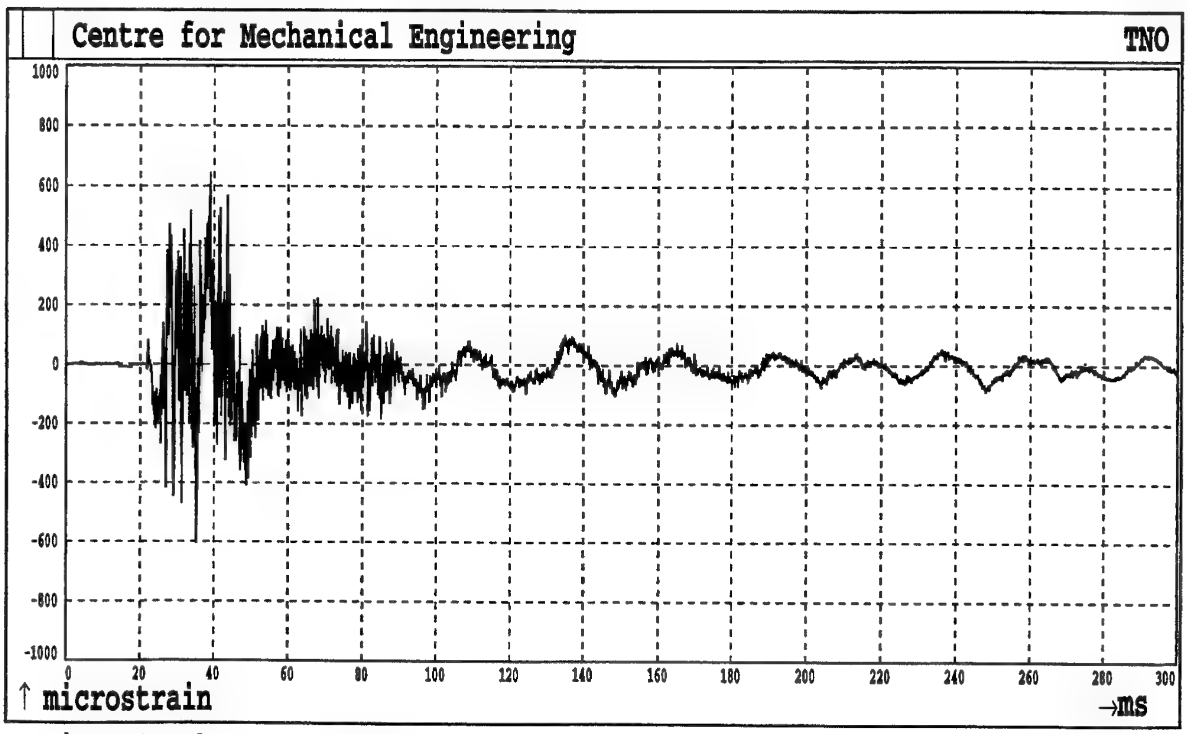


Fig.1A8. Shot 1 Sensor S8

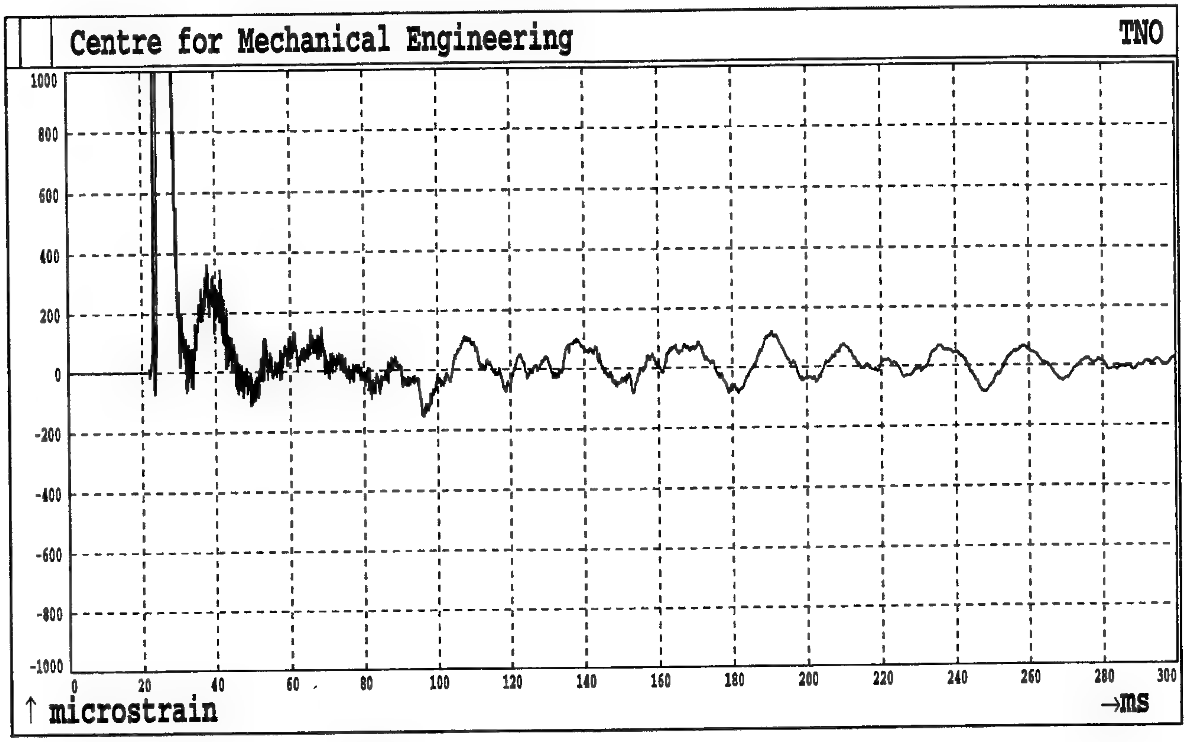


Fig.1A9. Shot 1 Sensor S10

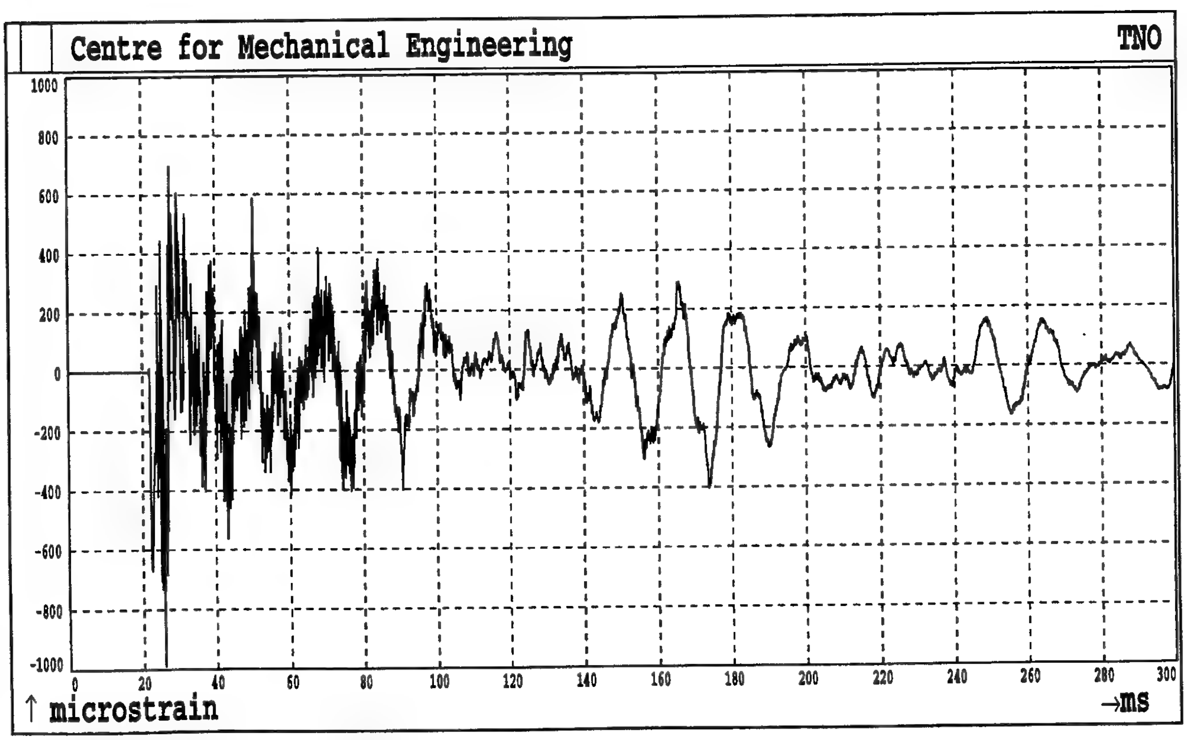


Fig.1A10. Shot 1 Sensor S11

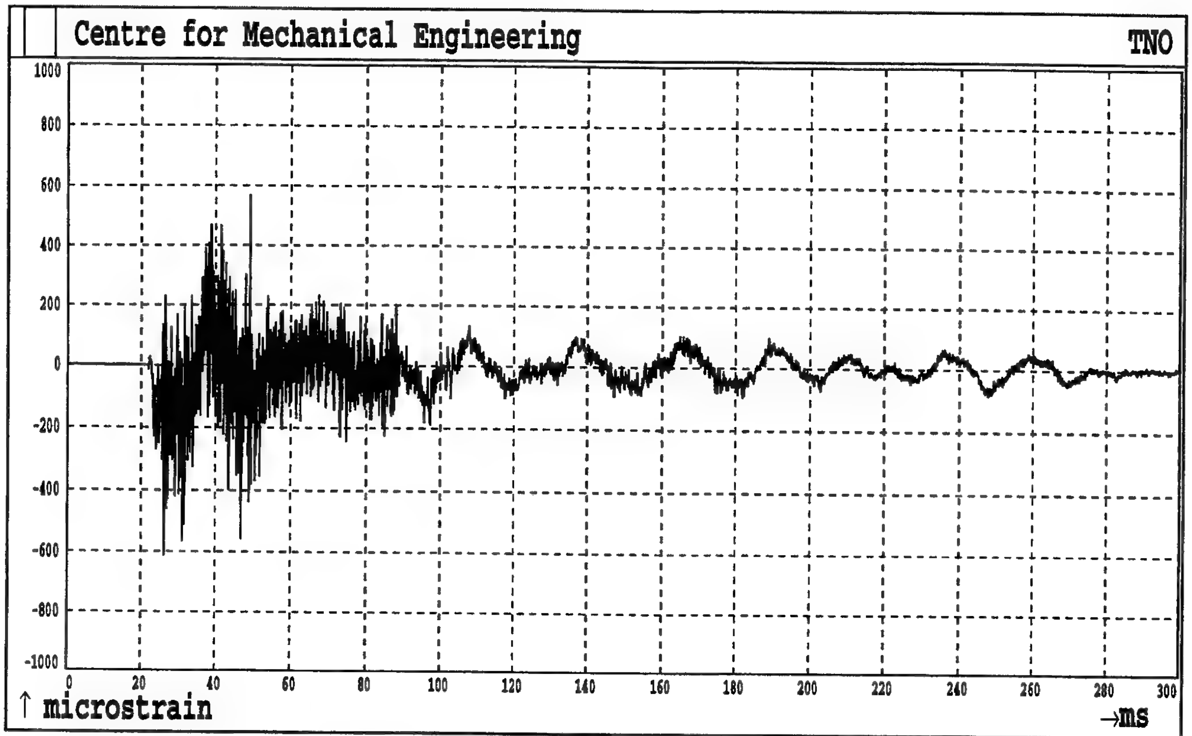


Fig.1A11. Shot 1 Sensor S12

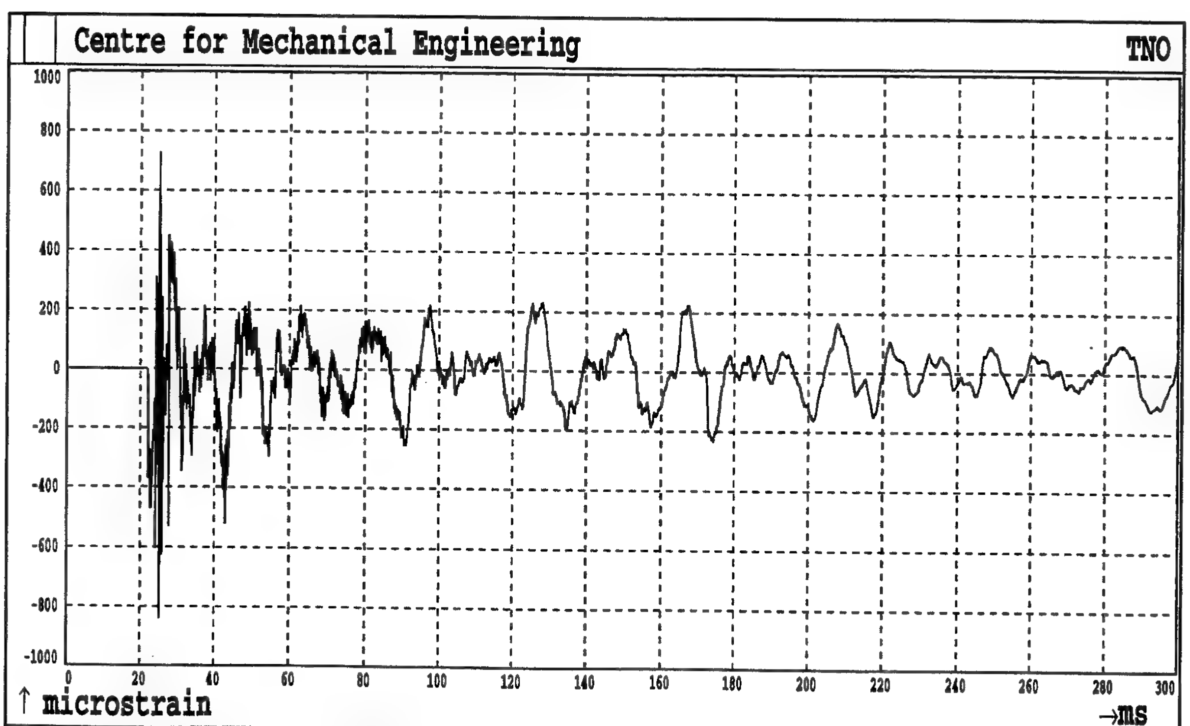


Fig.1A12. Shot 1 Sensor S13

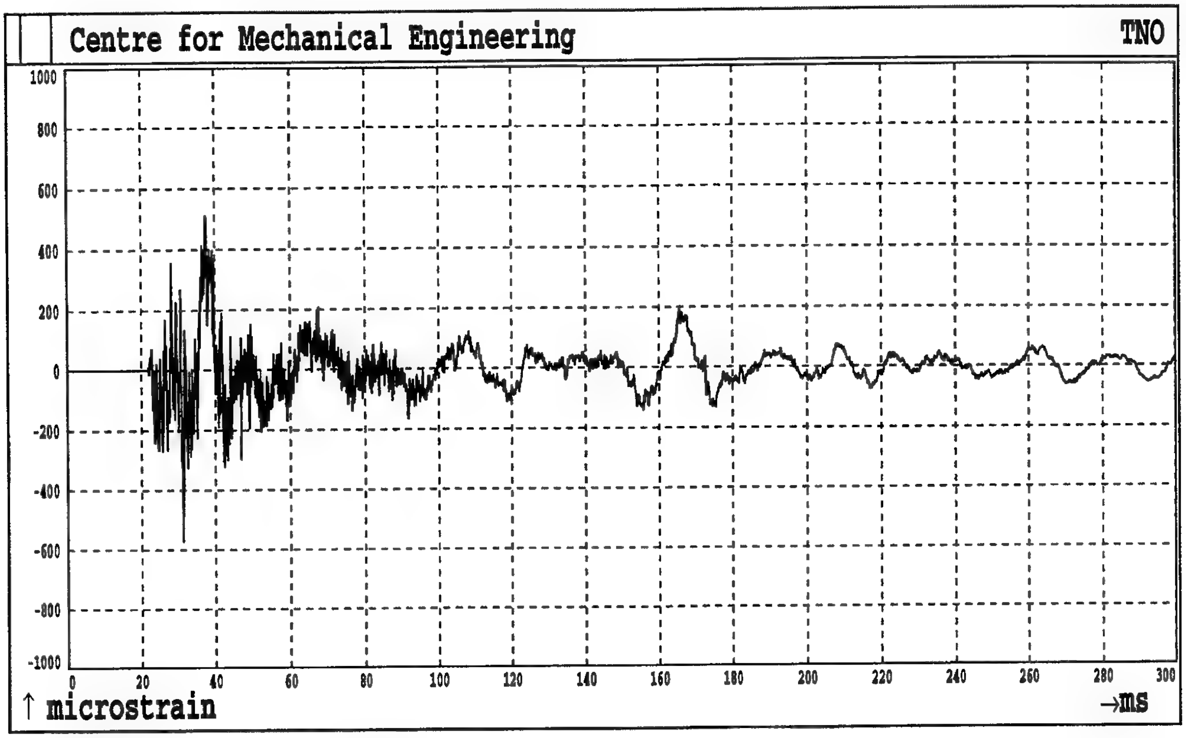


Fig.1A13. Shot 1 Sensor S14

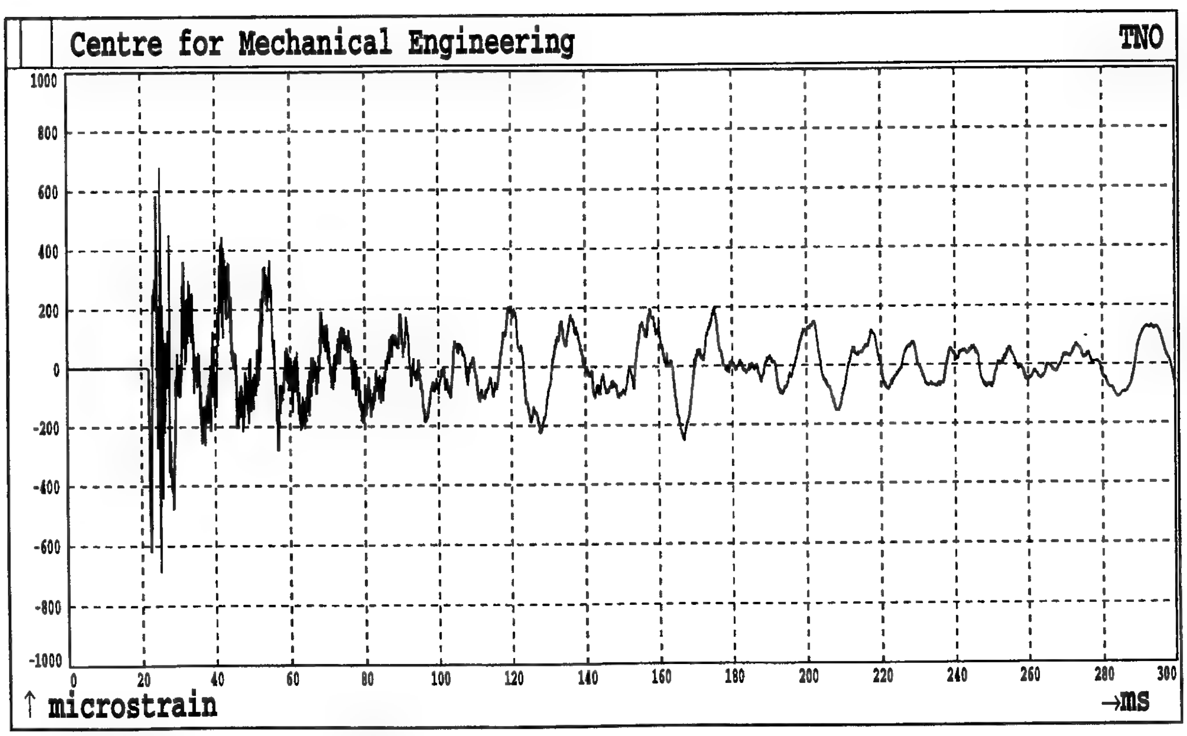


Fig.1A14. Shot 1 Sensor S15

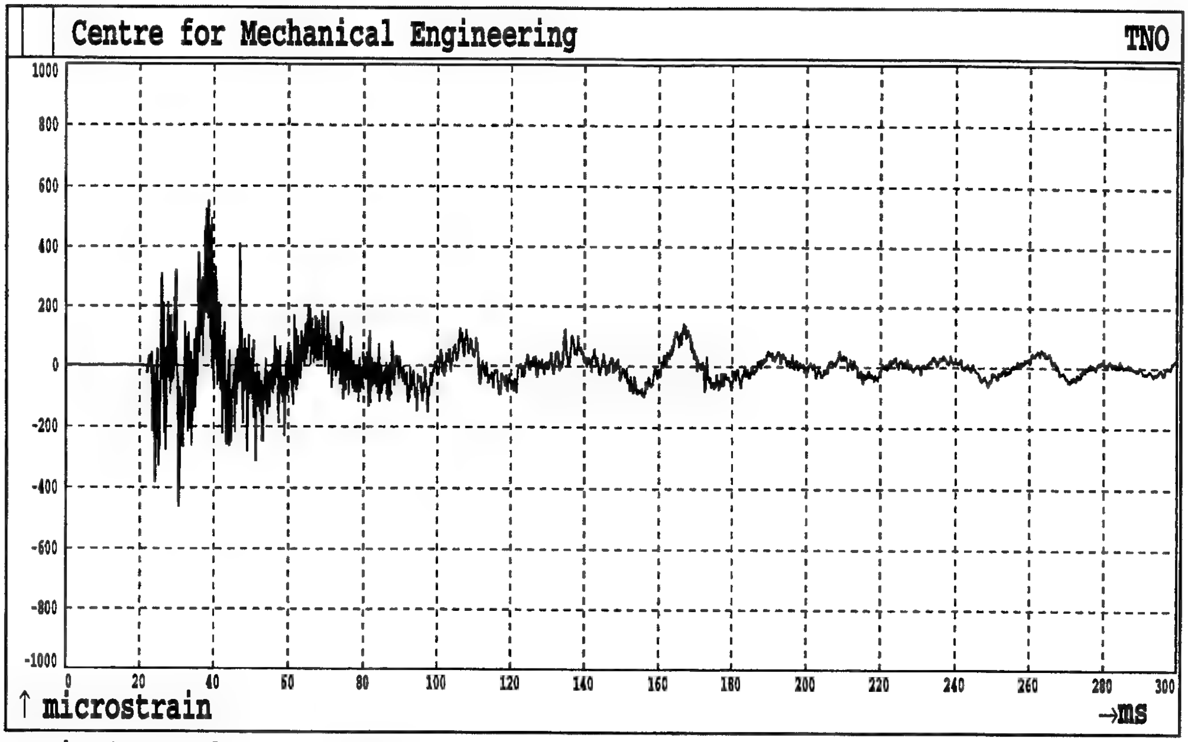


Fig.1A15. Shot 1 Sensor S16

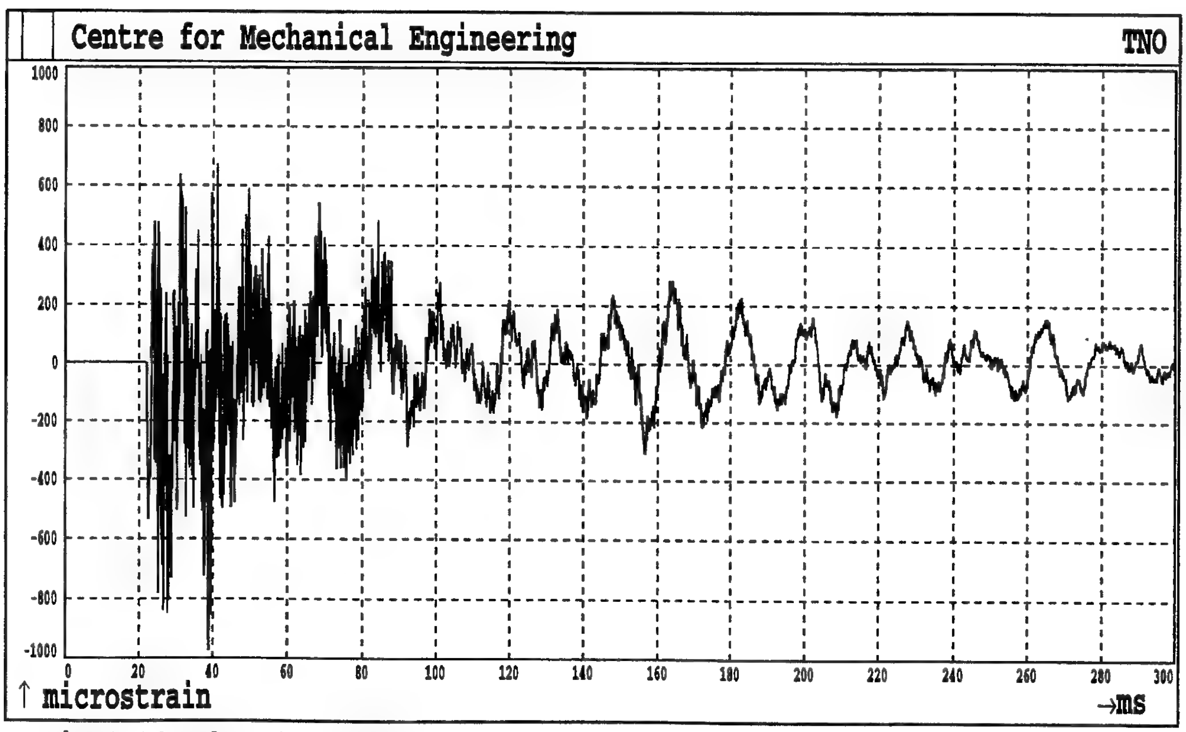


Fig.1A16. Shot 1 Sensor S17

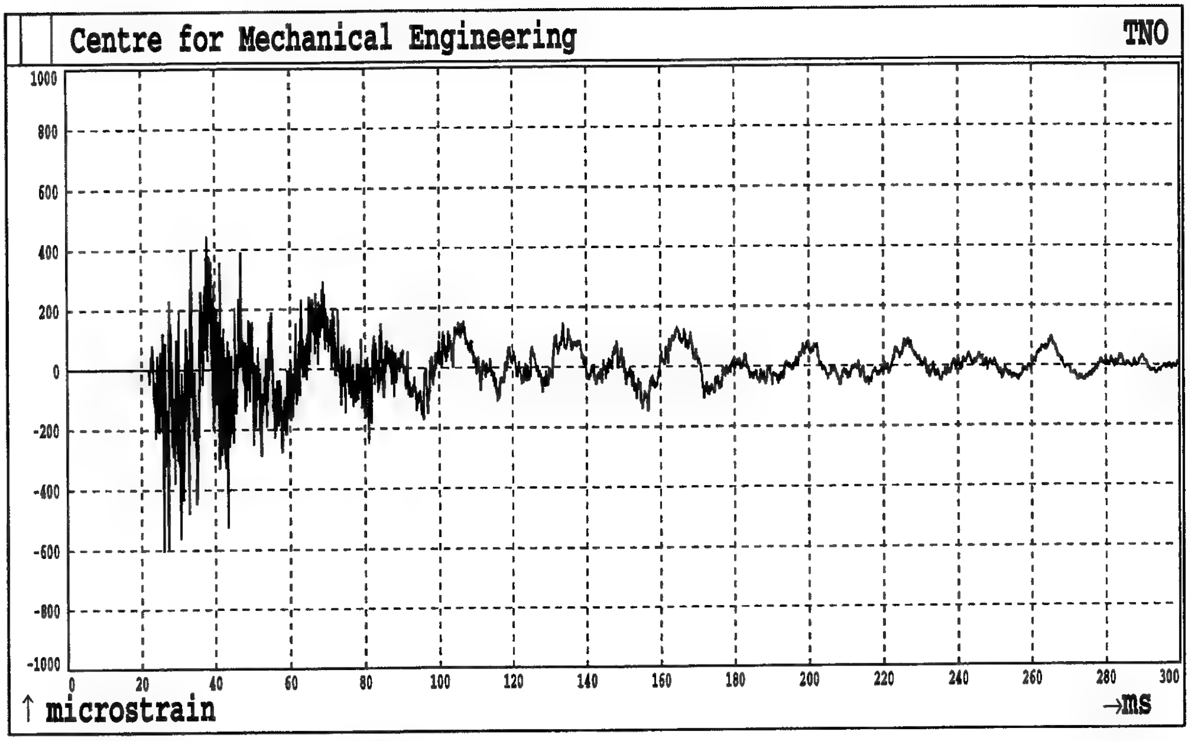


Fig.1A17. Shot 1 Sensor S18

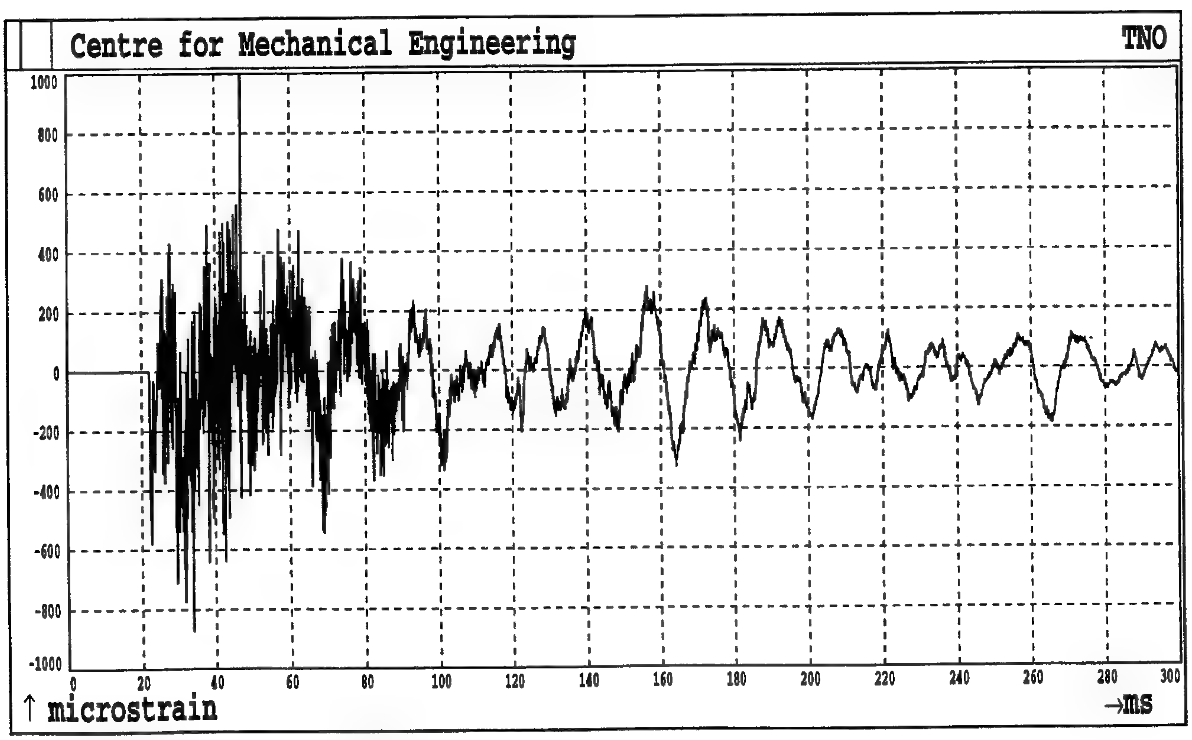


Fig.1A18. Shot 1 Sensor S19

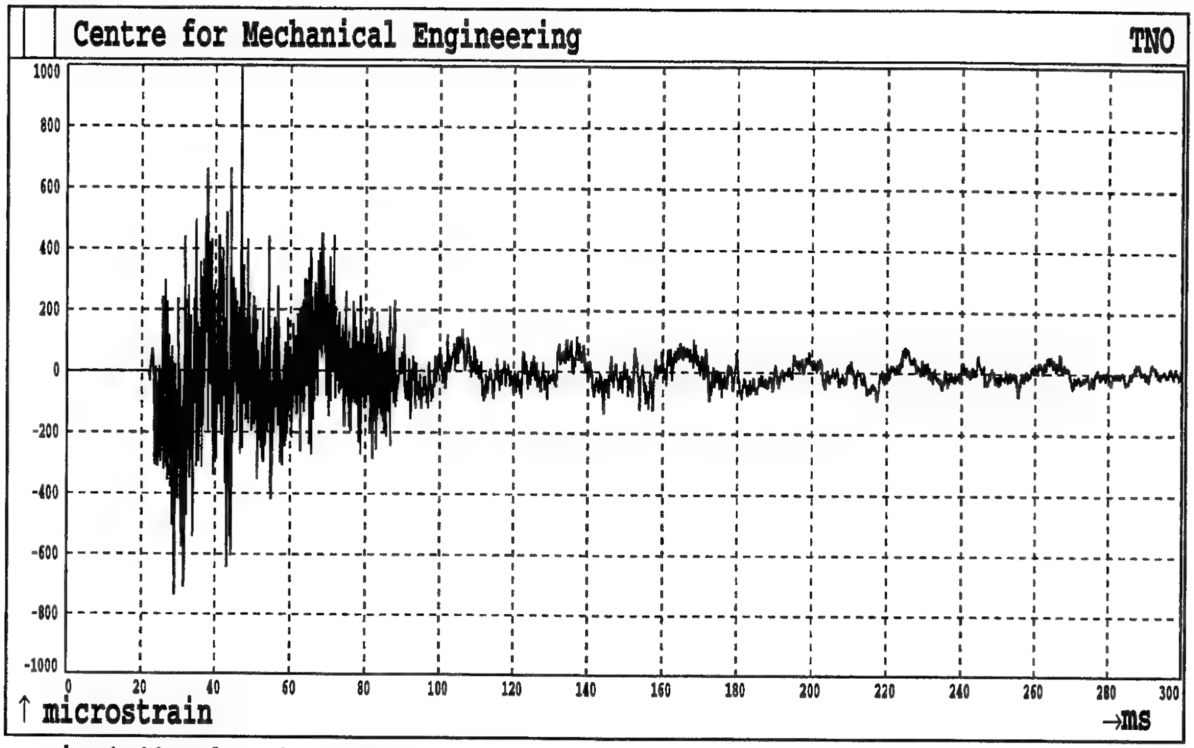


Fig.1A19. Shot 1 Sensor S20

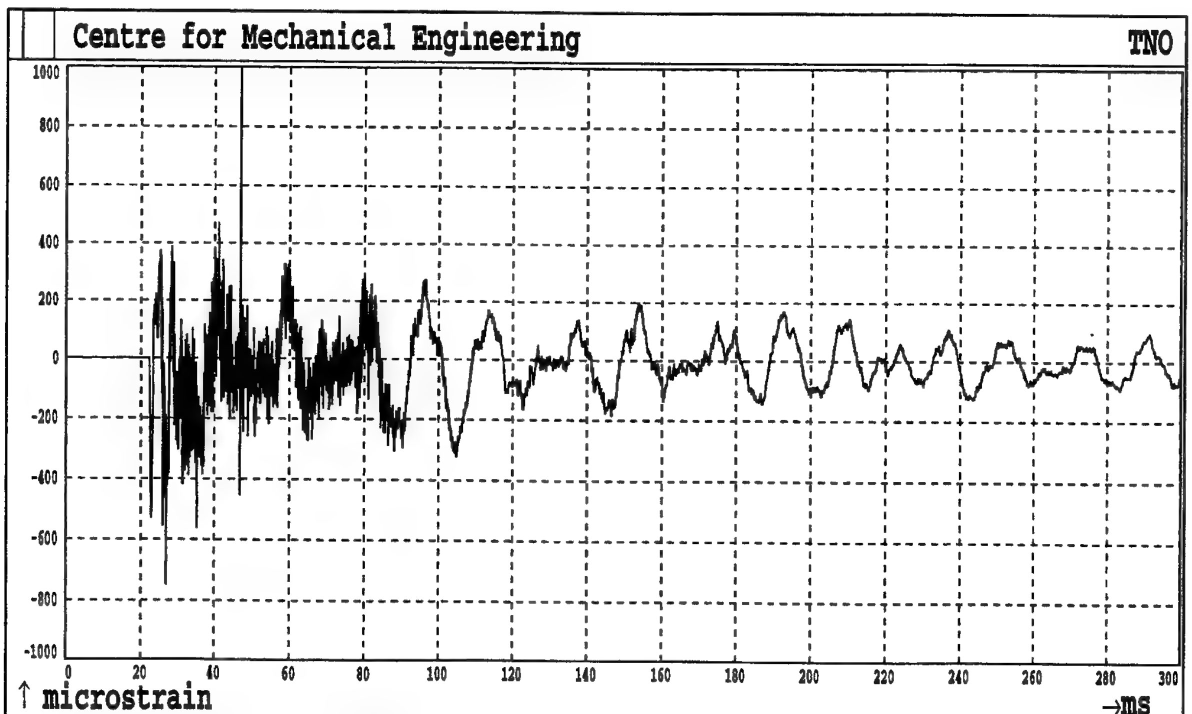


Fig.1A20. Shot 1 Sensor S21

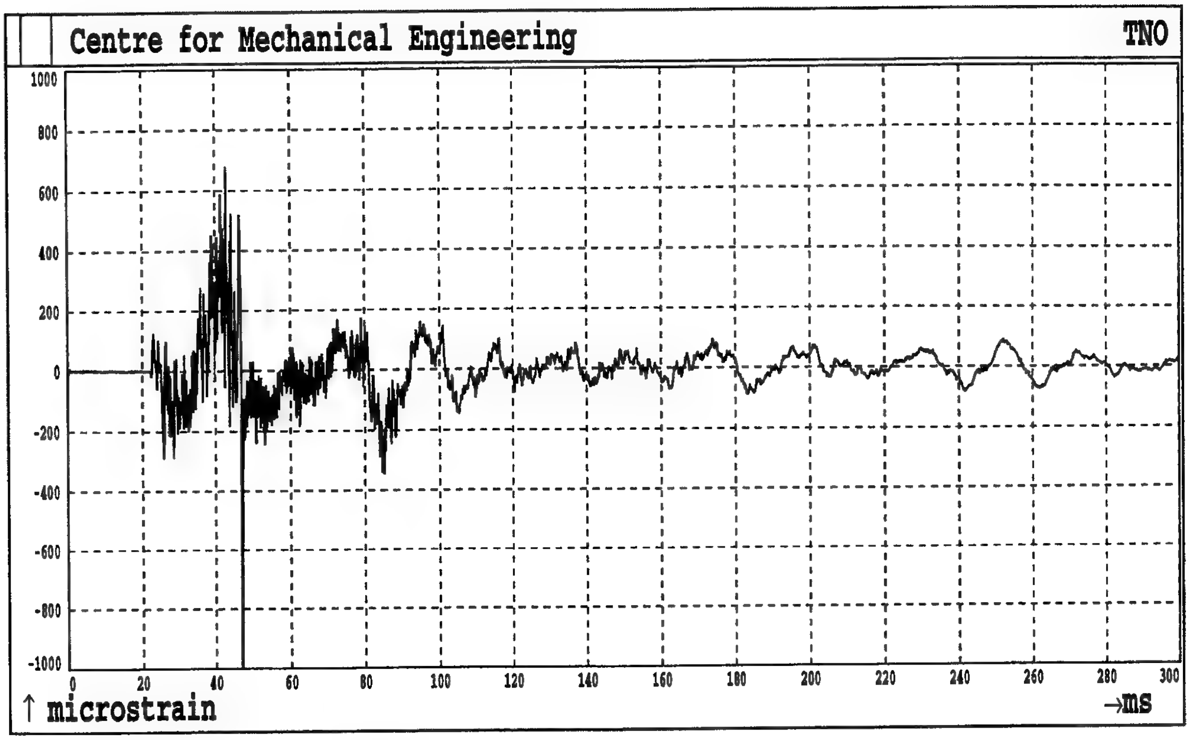


Fig.1A21. Shot 1 Sensor S22

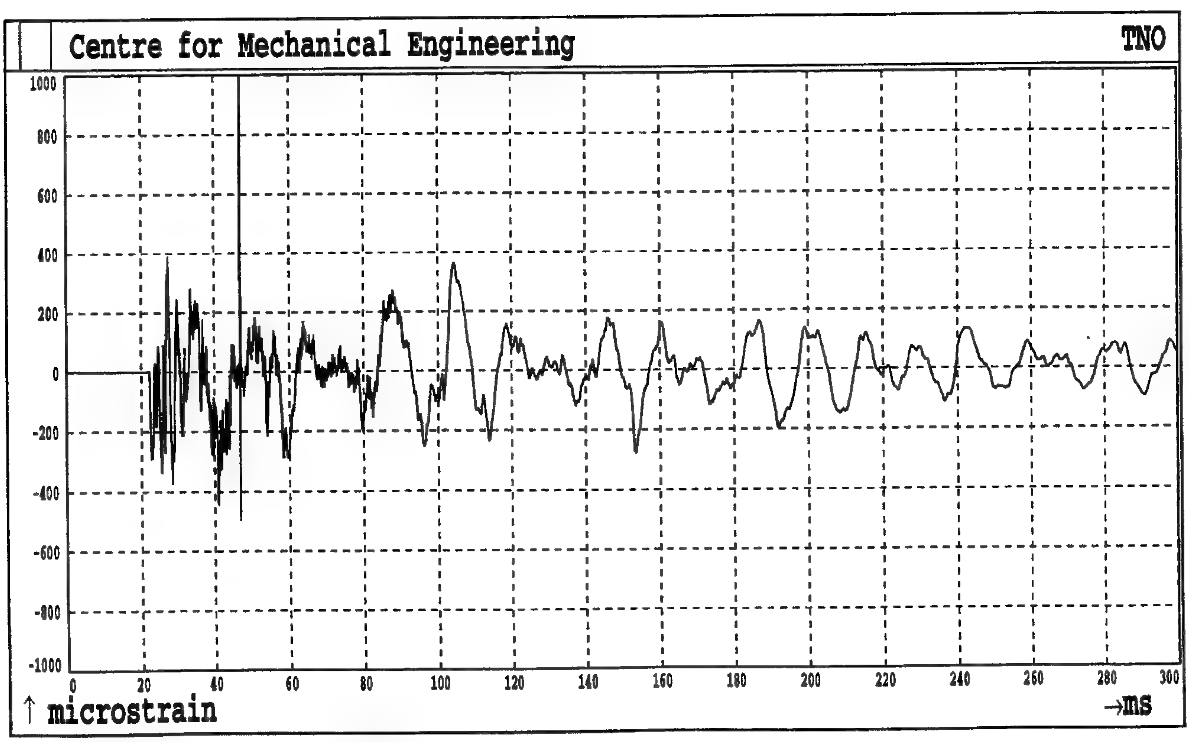


Fig.1A22. Shot 1 Sensor S23

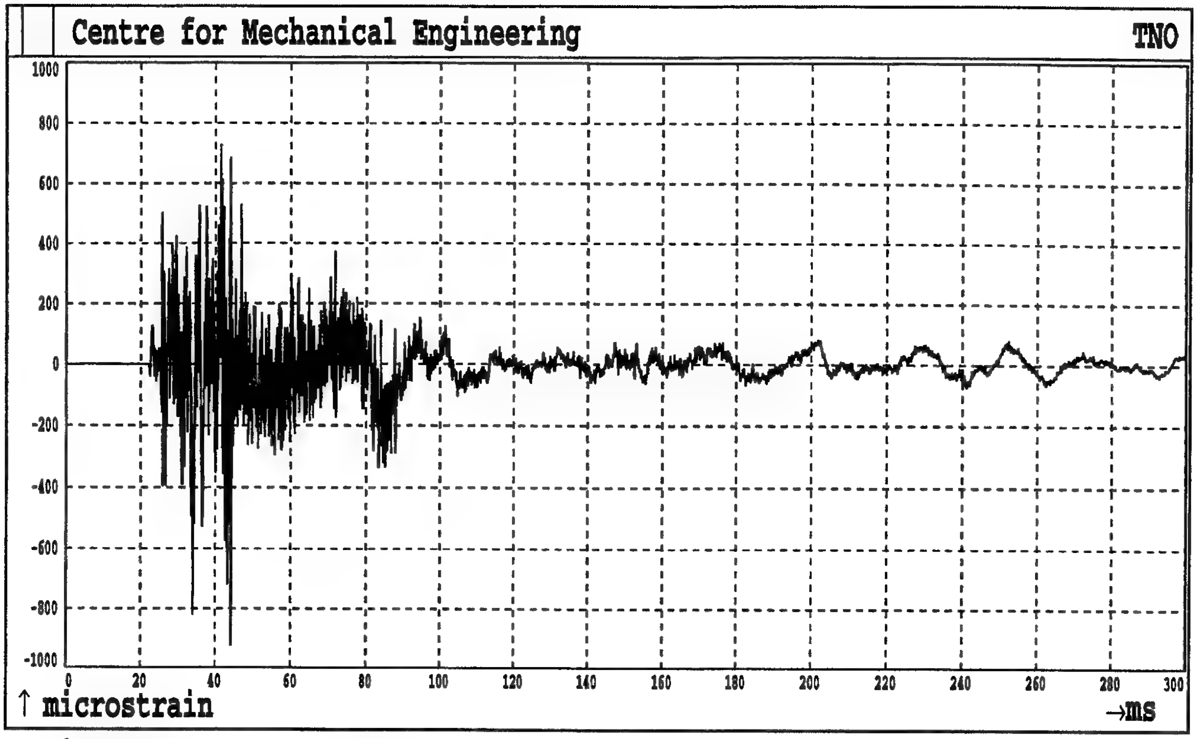


Fig.1A23. Shot 1 Sensor S24

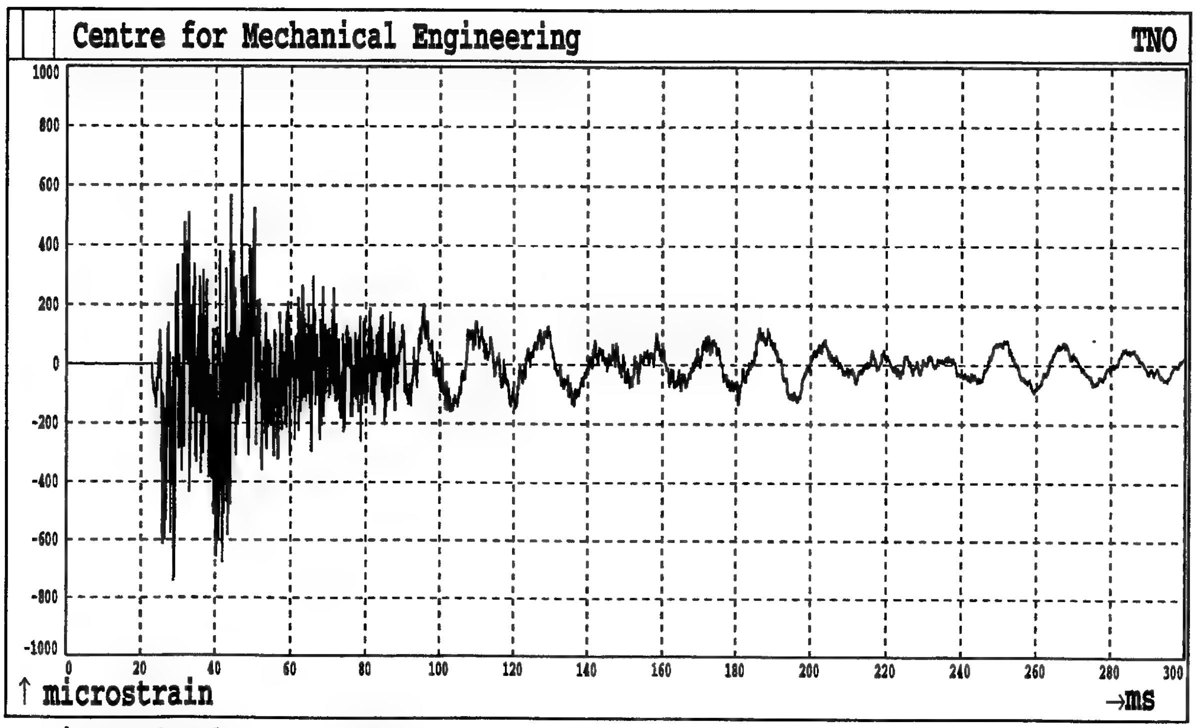


Fig.1A24. Shot 1 Sensor S25

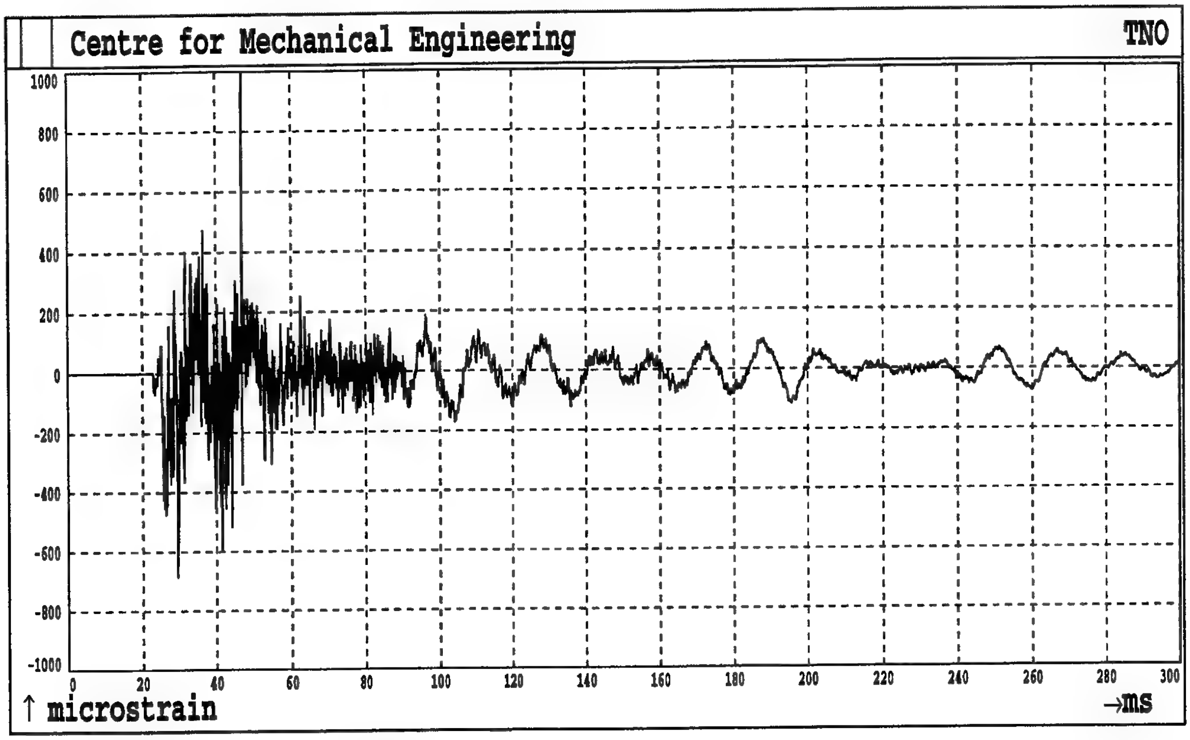


Fig.1A25. Shot 1 Sensor S26

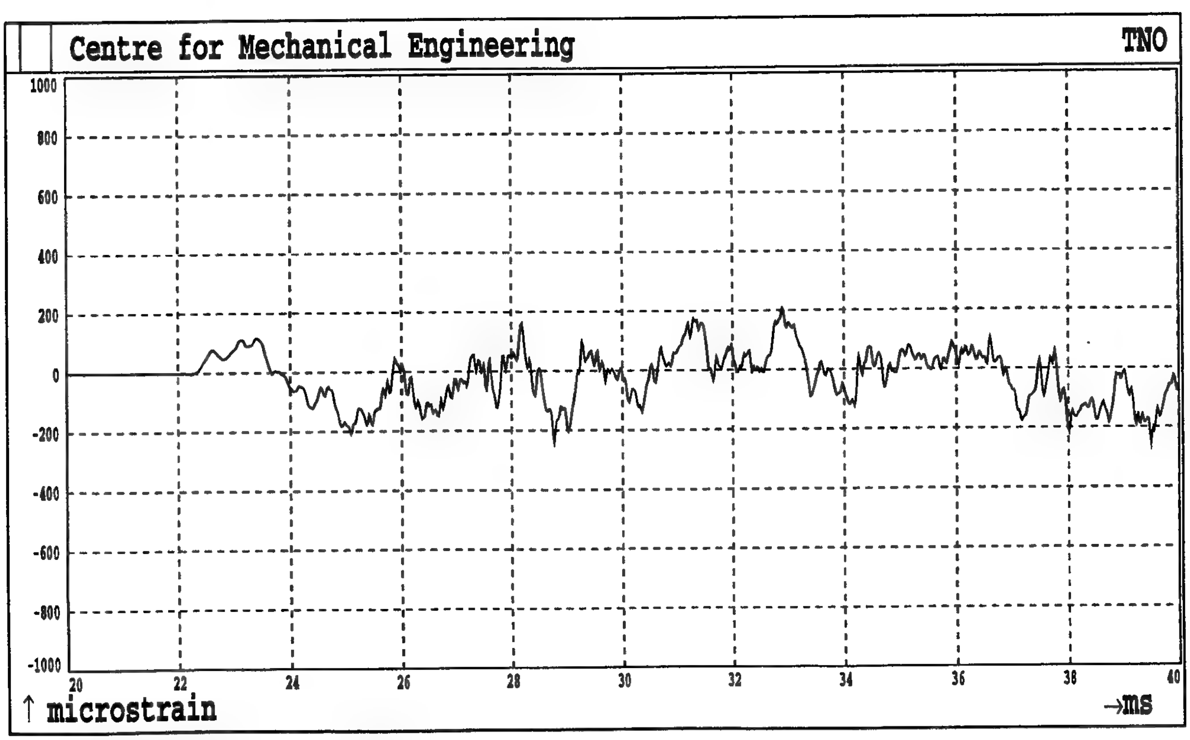


Fig.1A26. Shot 1 Sensor S1

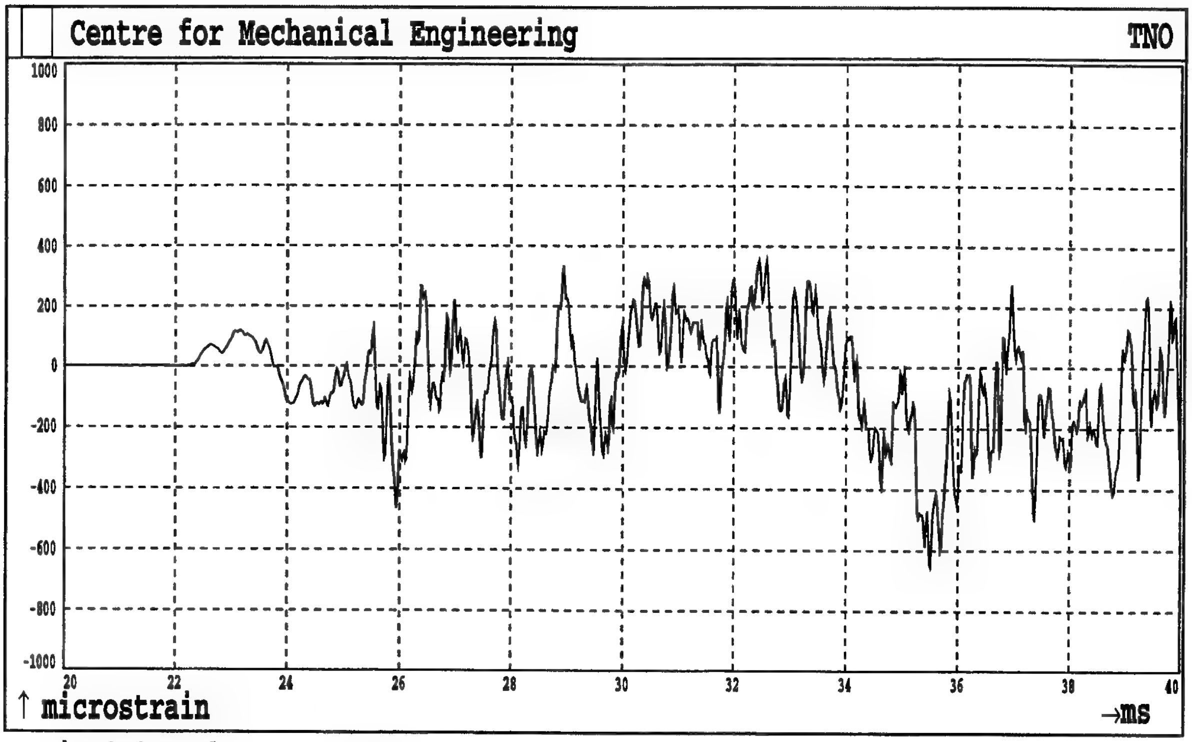


Fig.1A27. Shot 1 Sensor S2

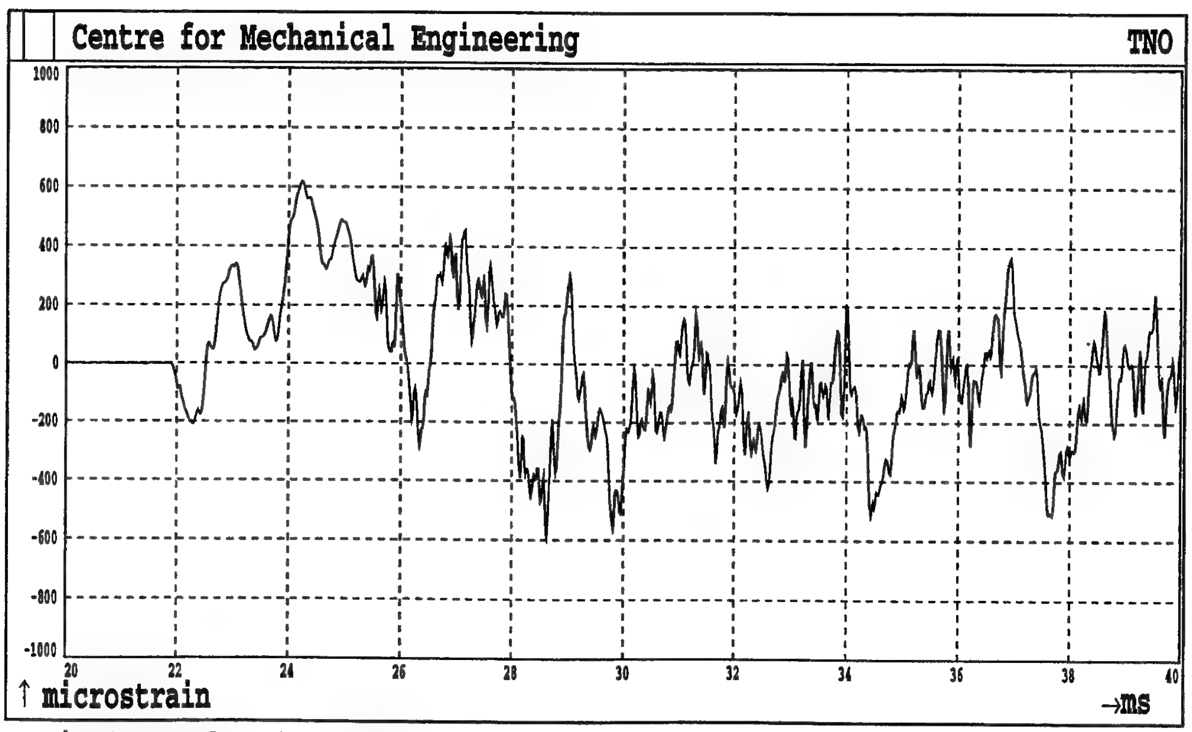


Fig.1A28. Shot 1 Sensor S3

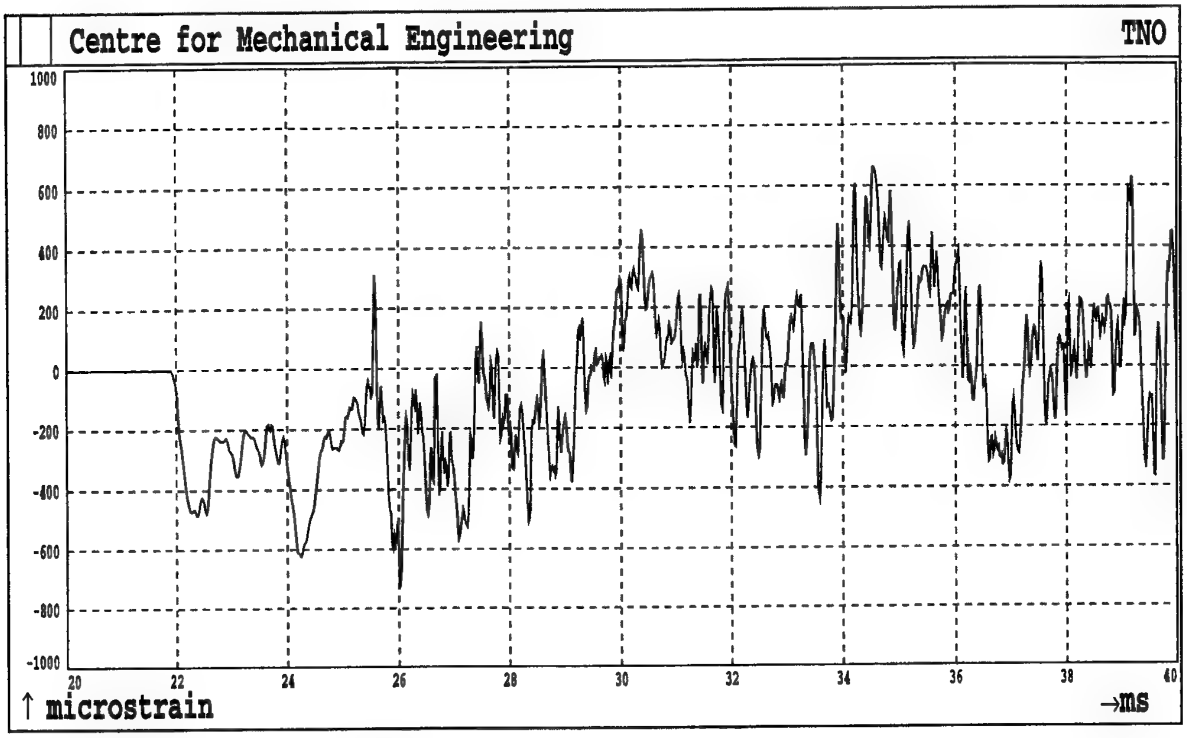


Fig.1A29. Shot 1 Sensor S4

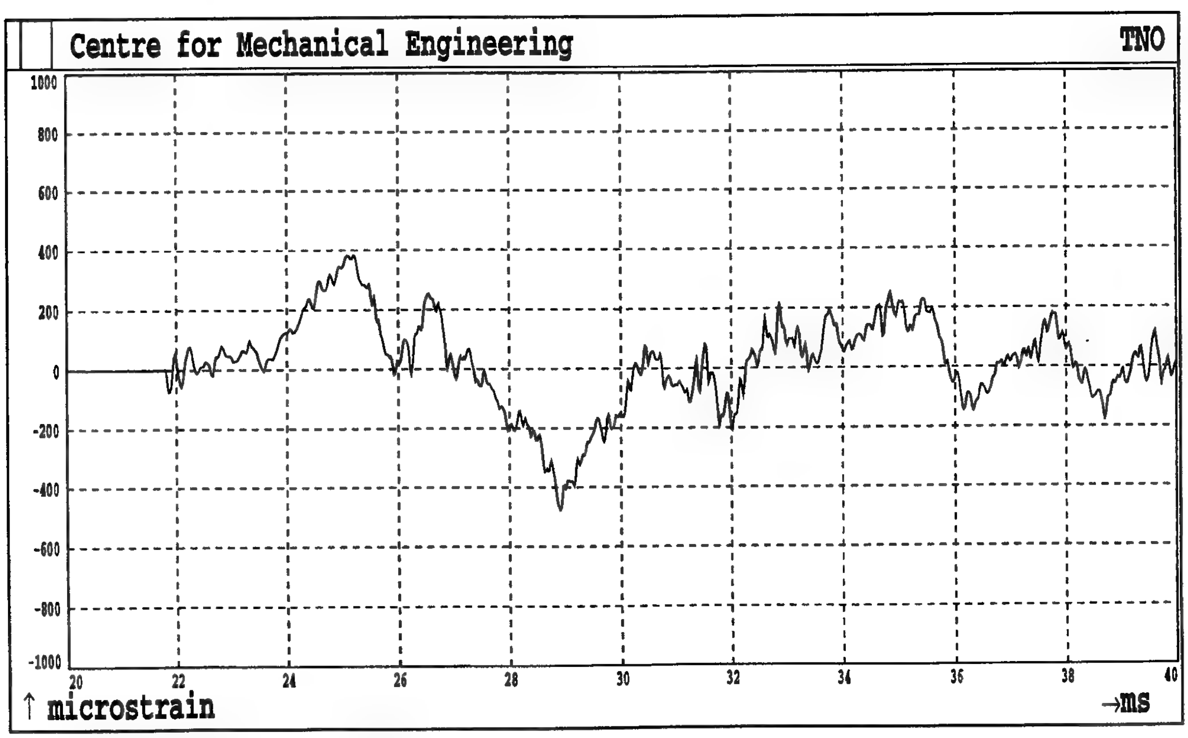


Fig.1A30. Shot 1 Sensor S5

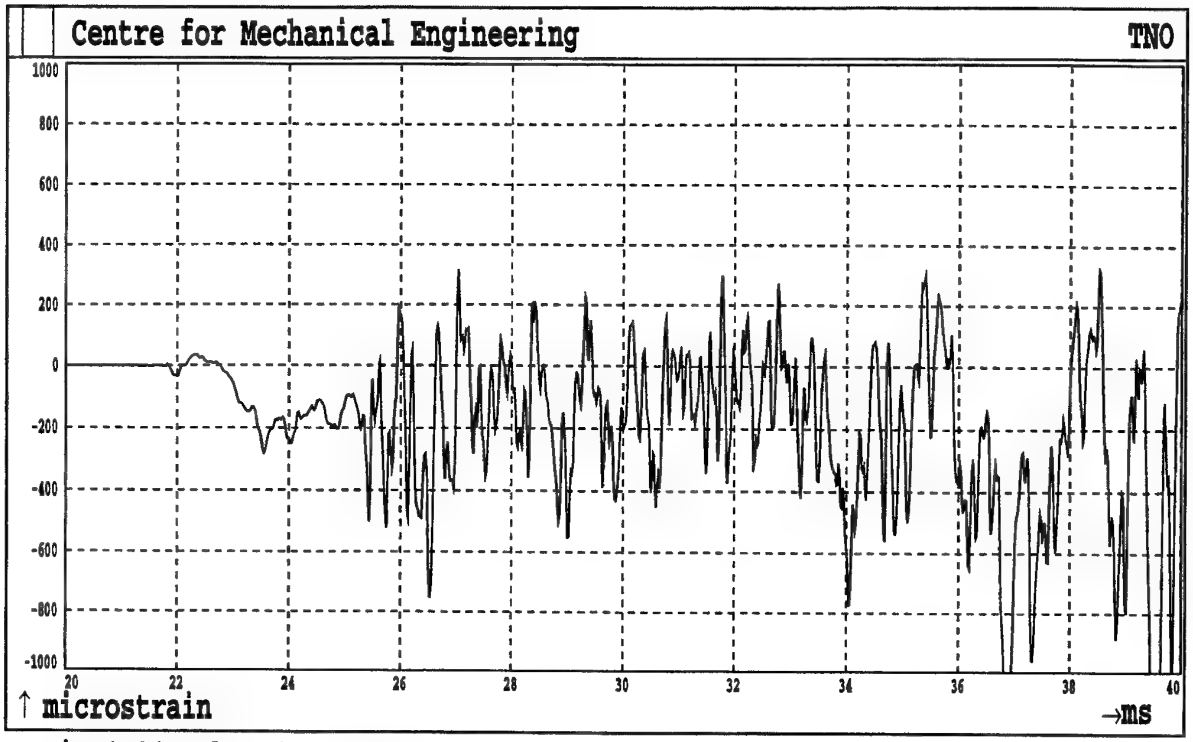


Fig.1A31. Shot 1 Sensor S6

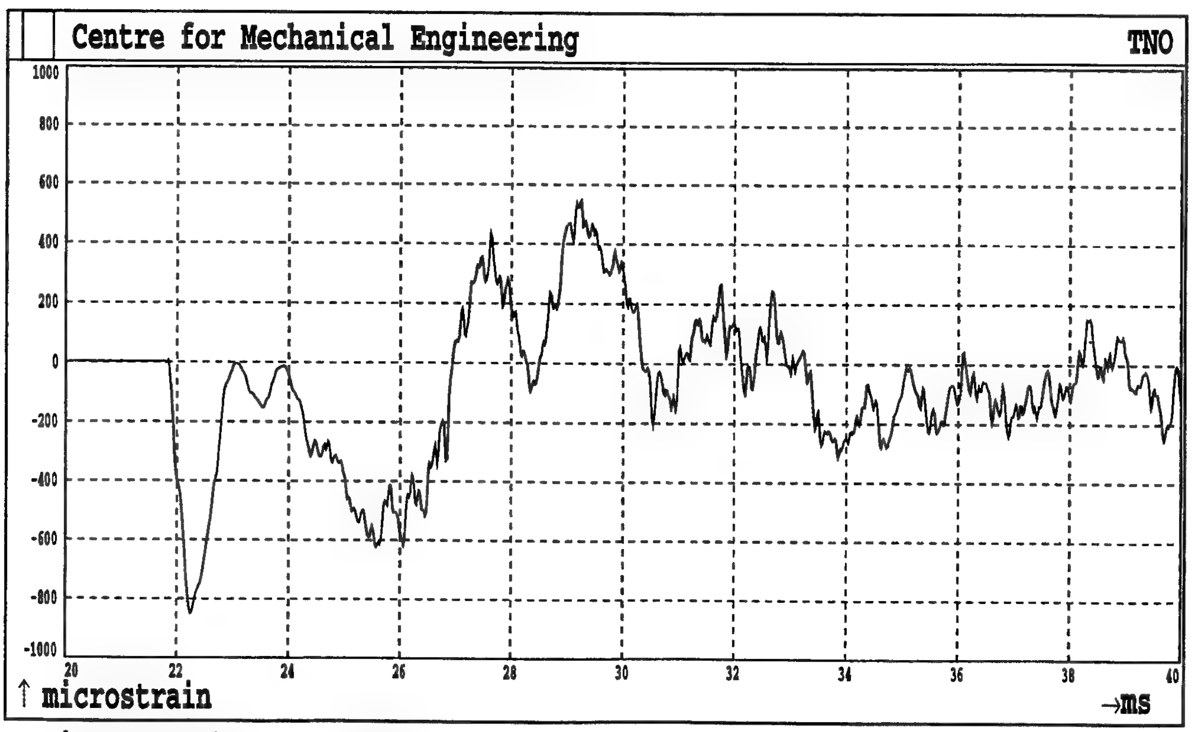


Fig.1A32. Shot 1 Sensor S7

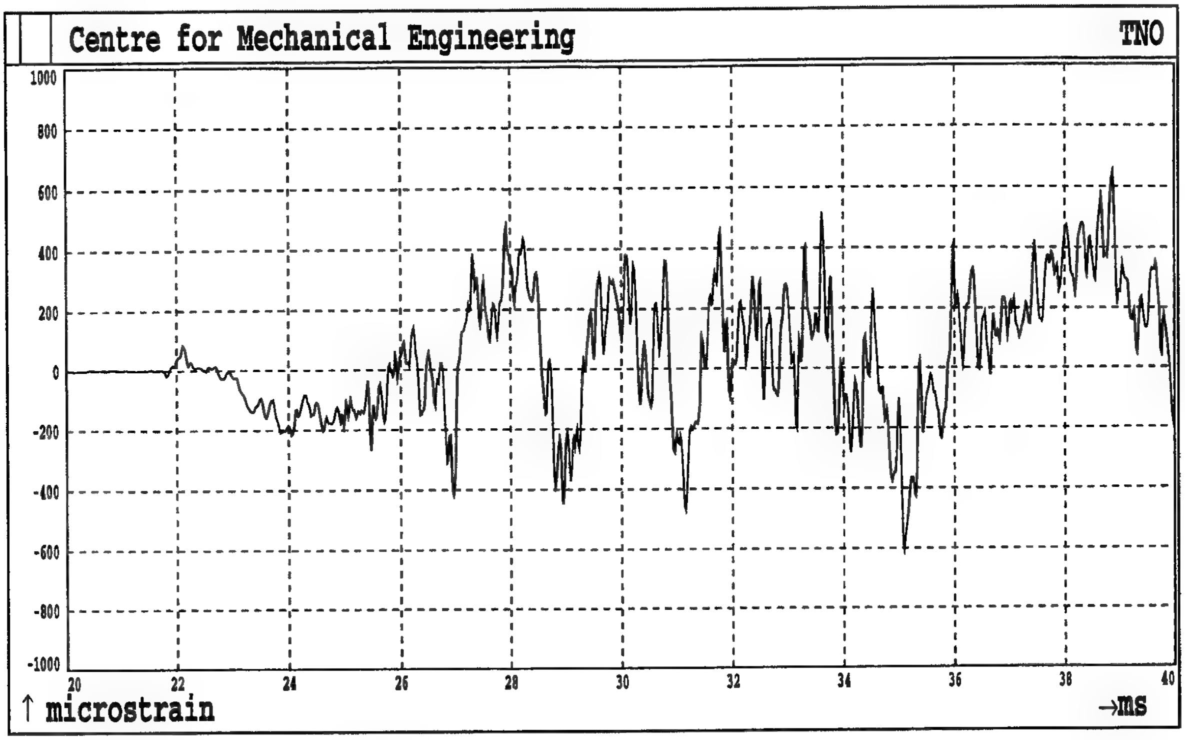


Fig.1A33. Shot 1 Sensor S8

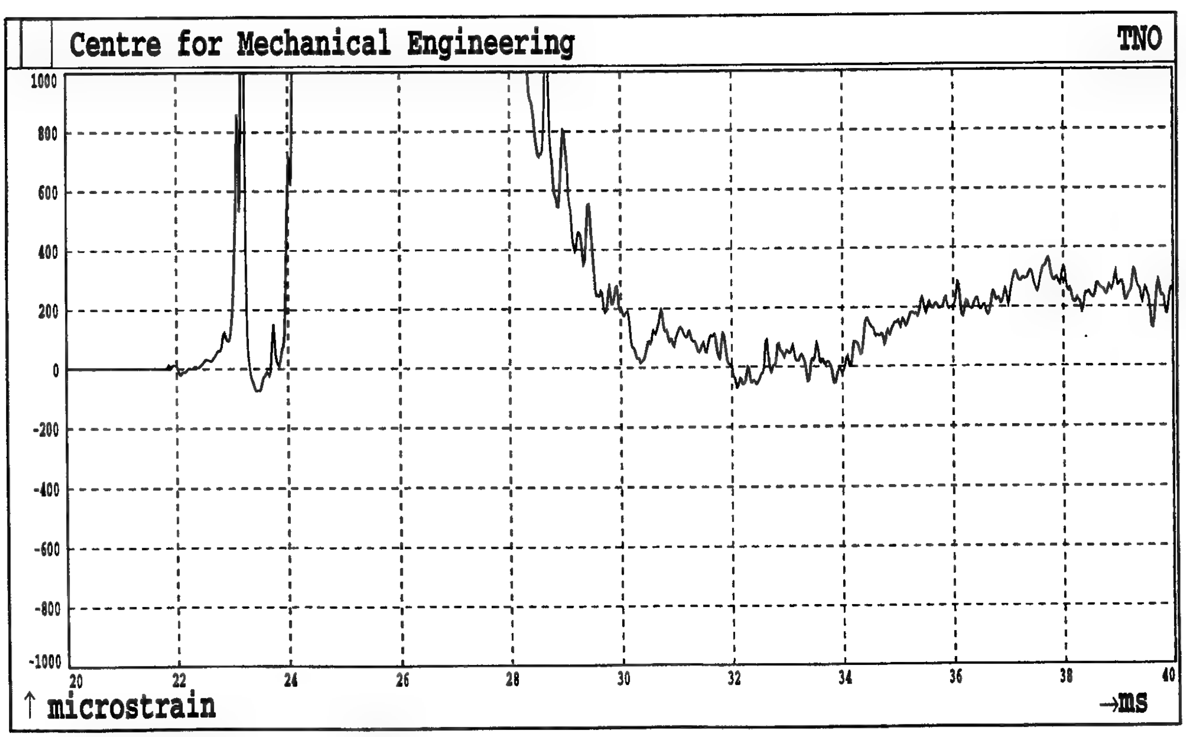


Fig.1A34. Shot 1 Sensor S10

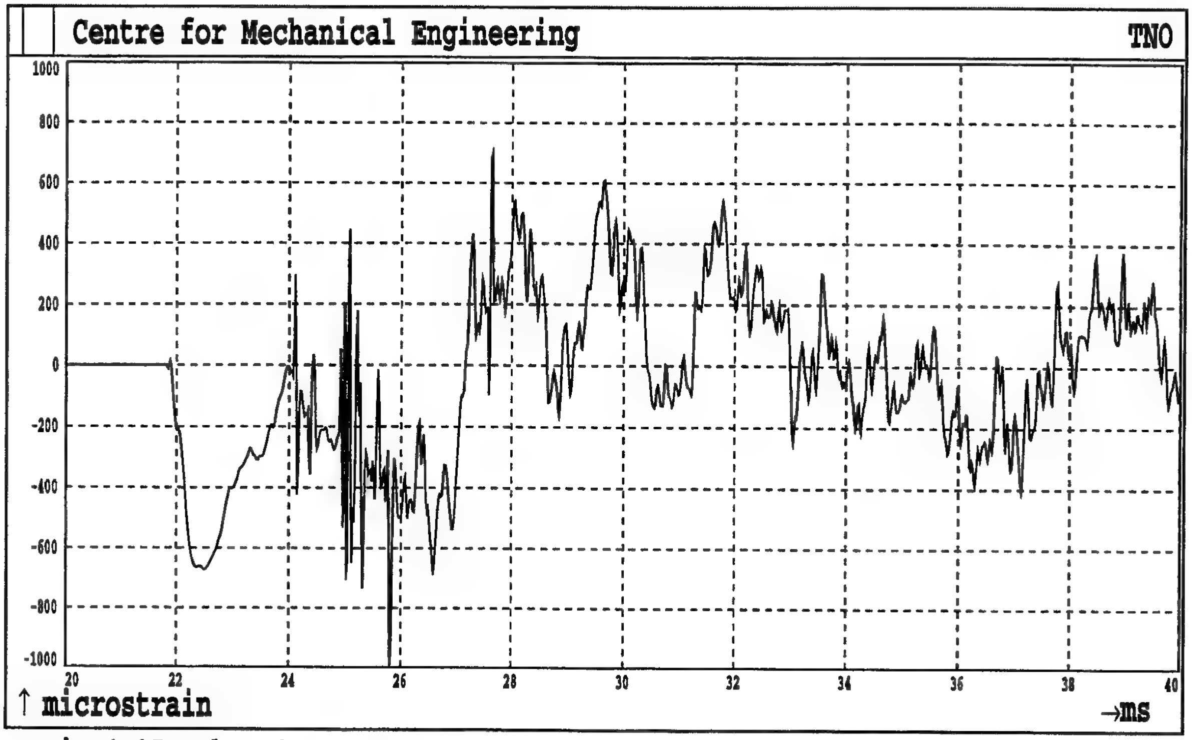


Fig.1A35. Shot 1 Sensor S11

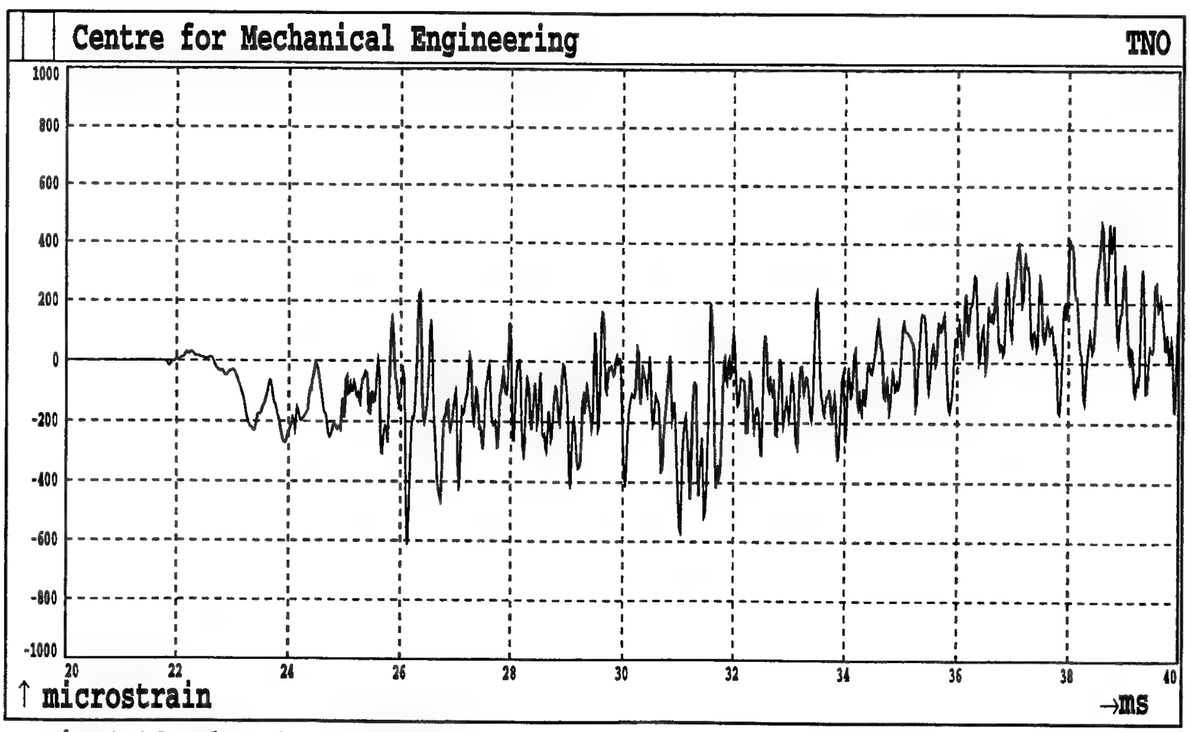


Fig.1A36. Shot 1 Sensor S12

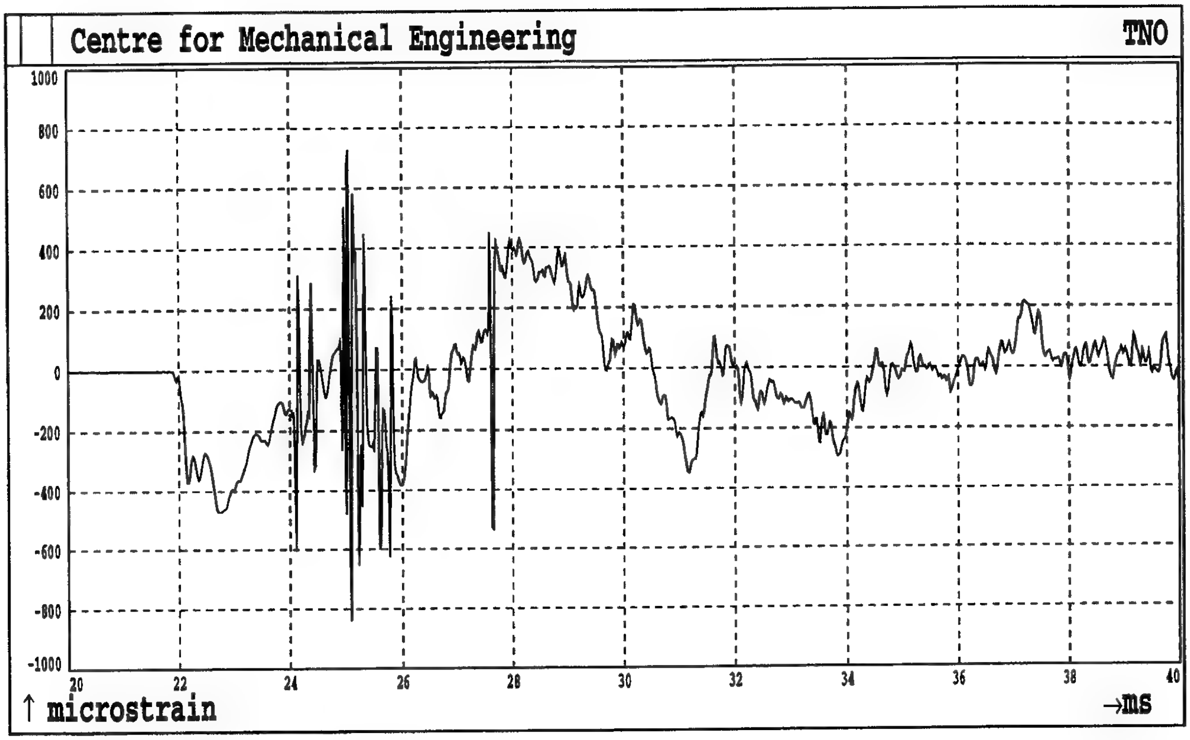


Fig.1A37. Shot 1 Sensor S13

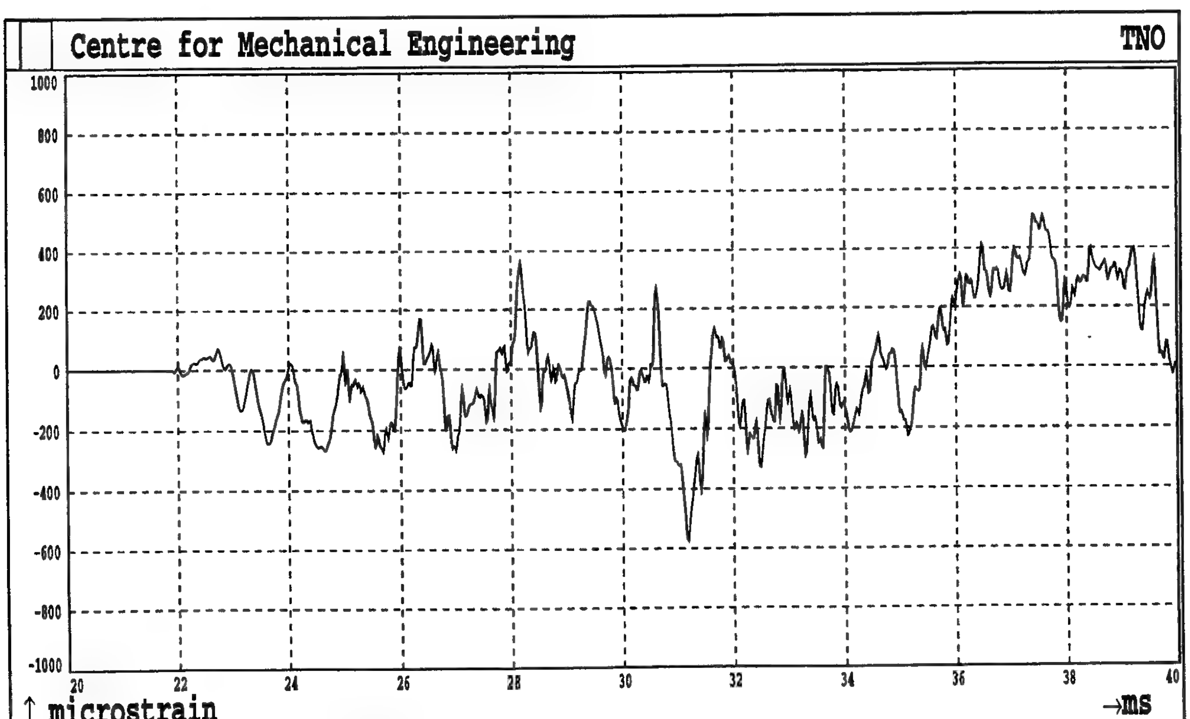


Fig.1A38. Shot 1 Sensor S14

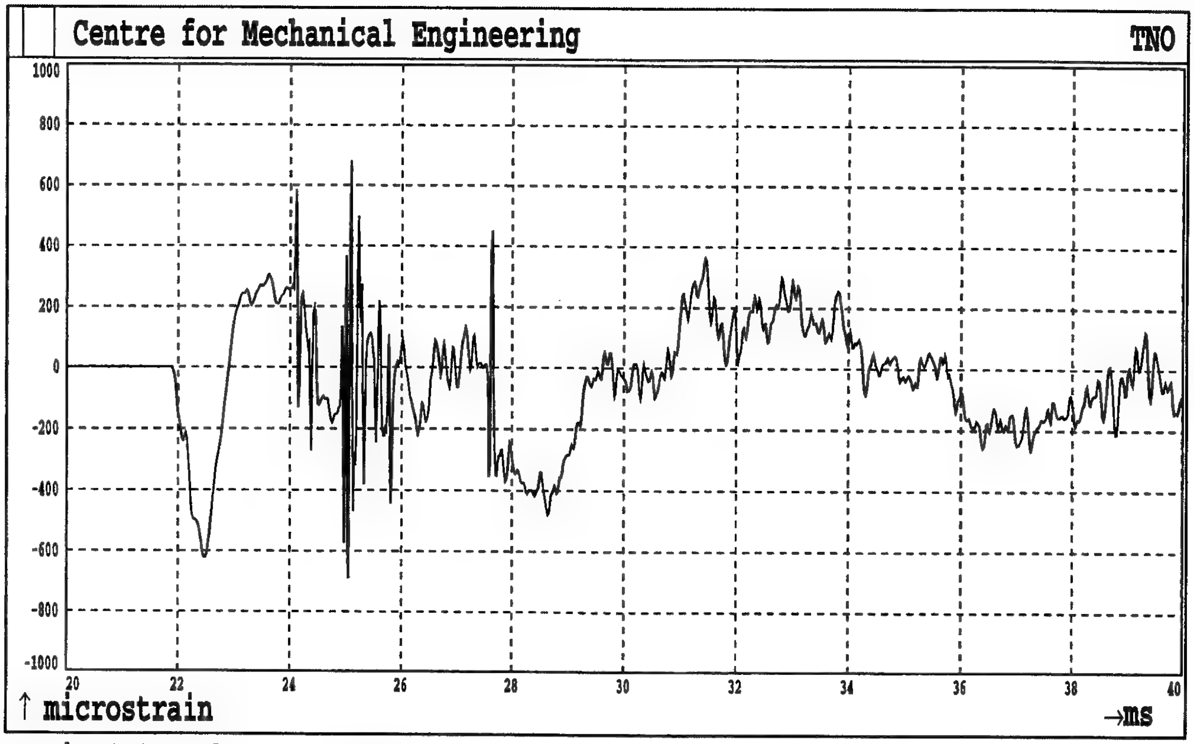


Fig.1A39. Shot 1 Sensor S15

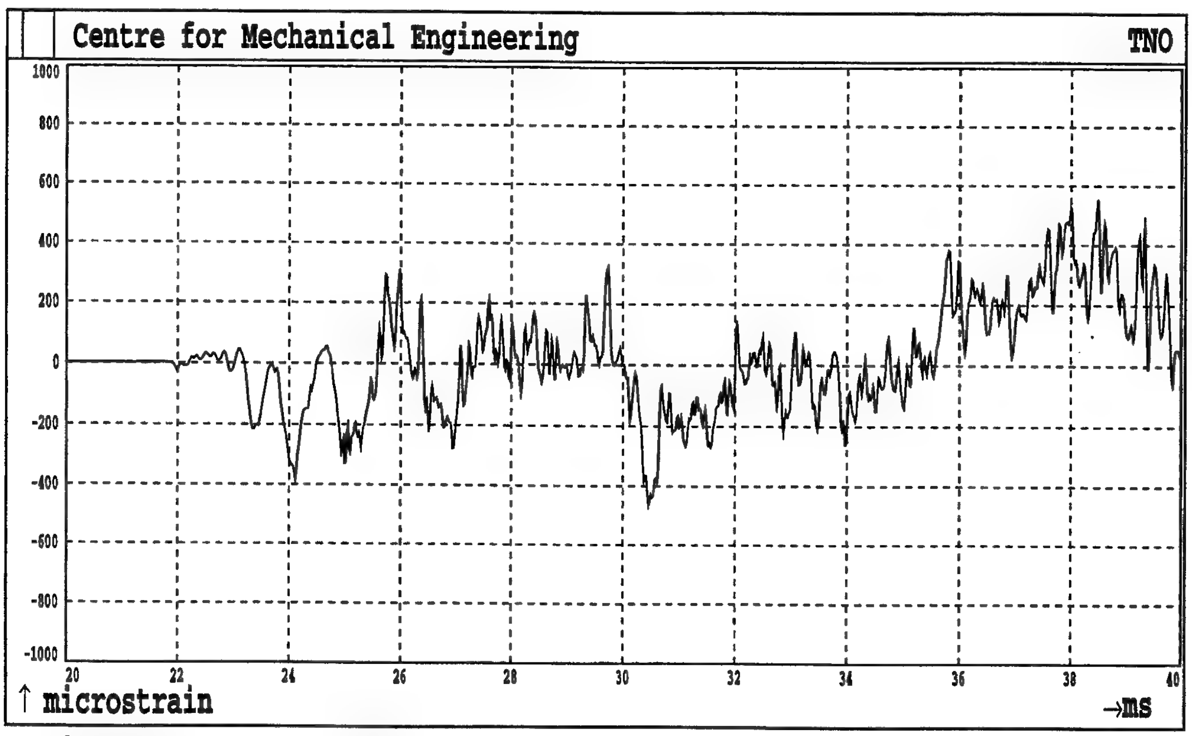


Fig.1A40. Shot 1 Sensor S16

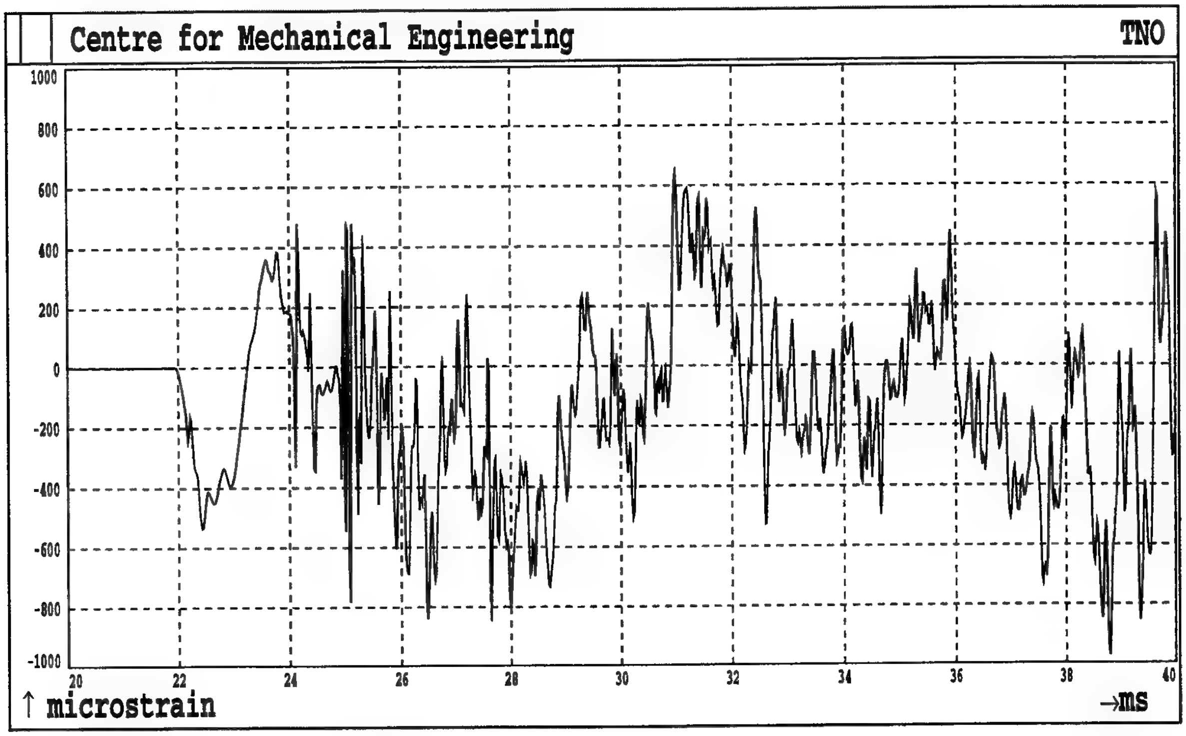


Fig.1A41. Shot 1 Sensor S17

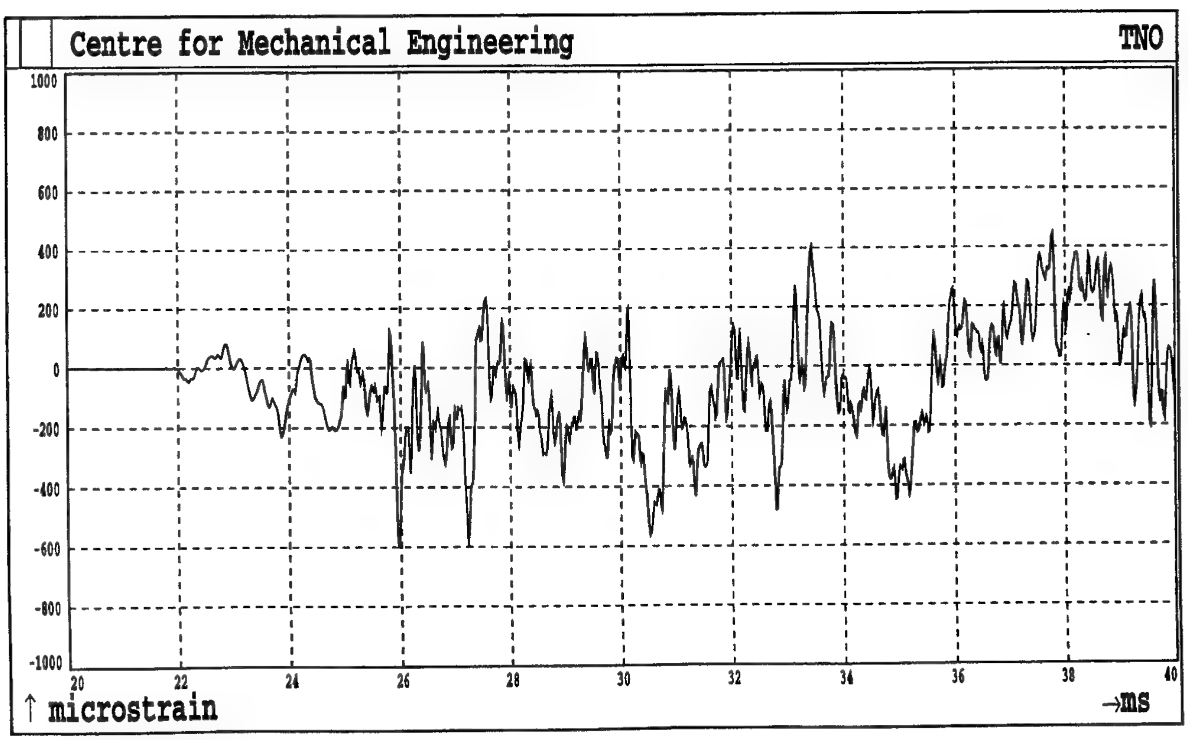


Fig.1A42. Shot 1 Sensor S18

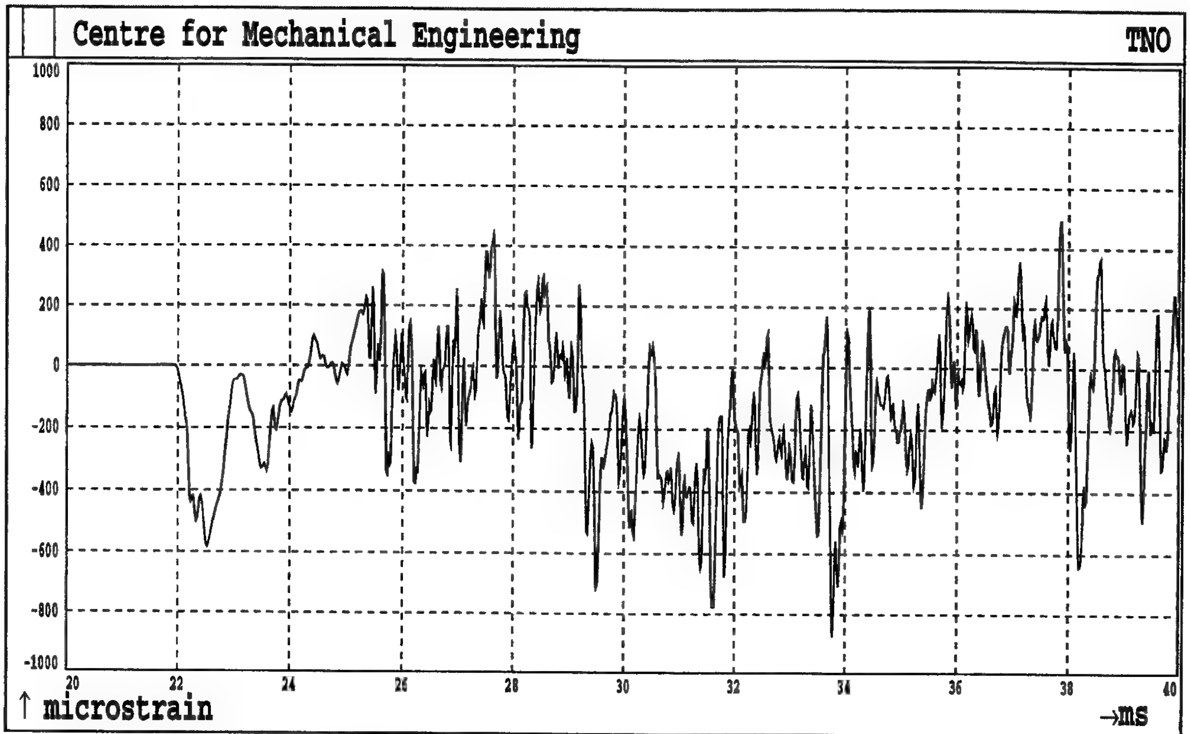


Fig.1A43. Shot 1   Sensor S19

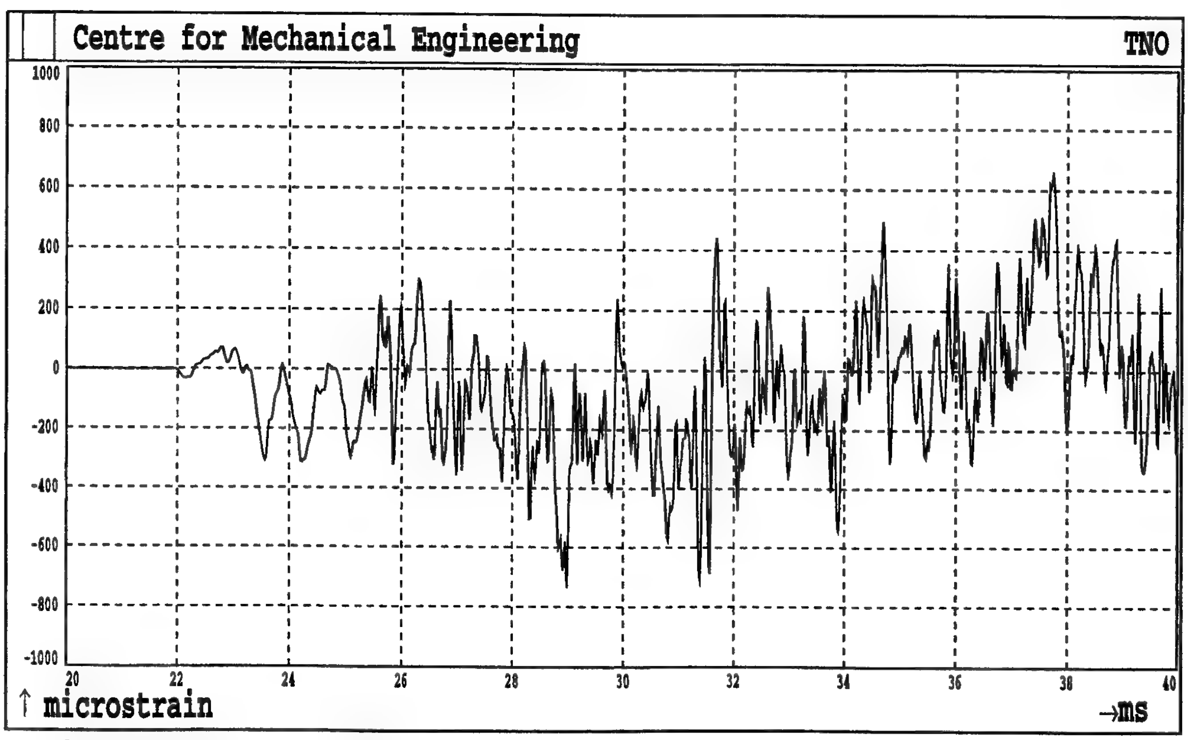


Fig.1A44. Shot 1   Sensor S20

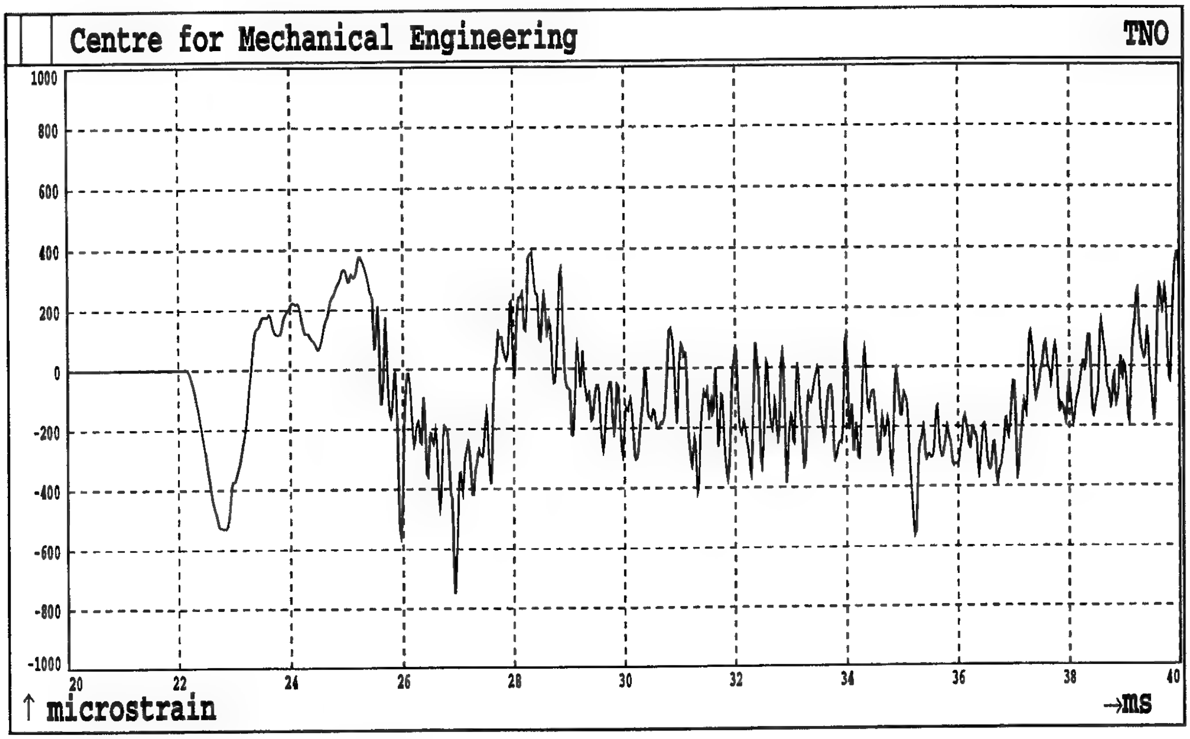


Fig.1A45. Shot 1 Sensor S21

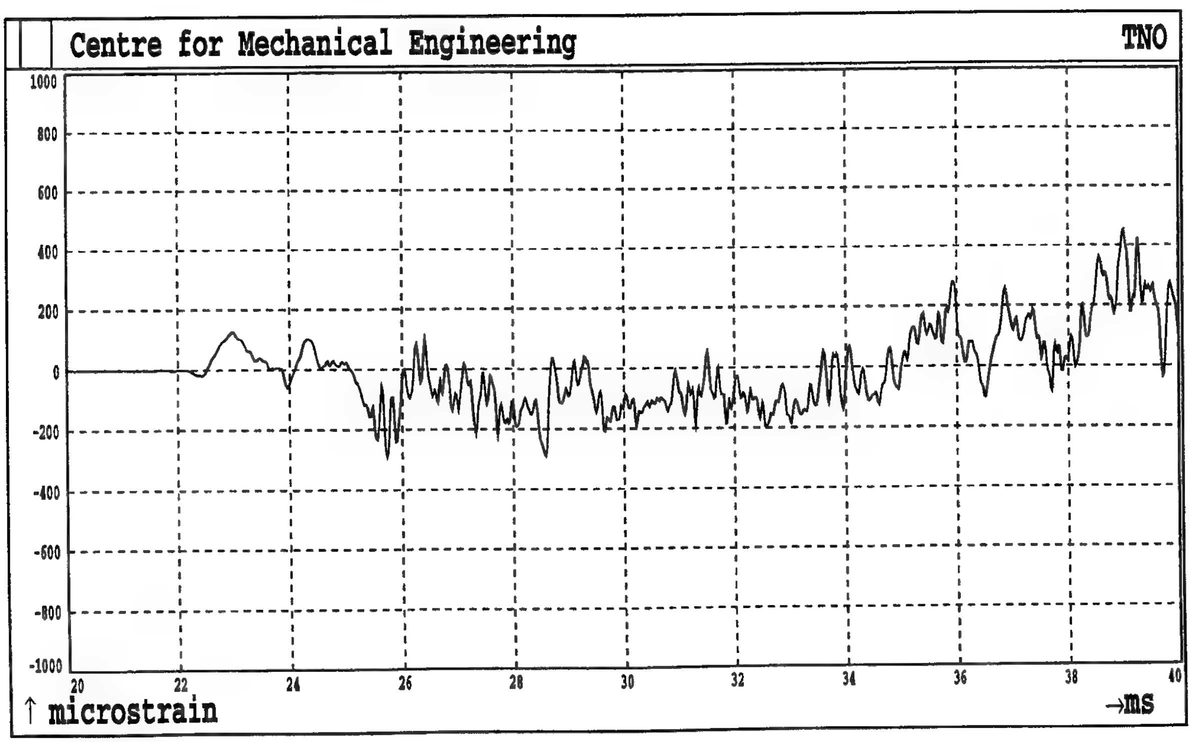


Fig.1A46. Shot 1 Sensor S22

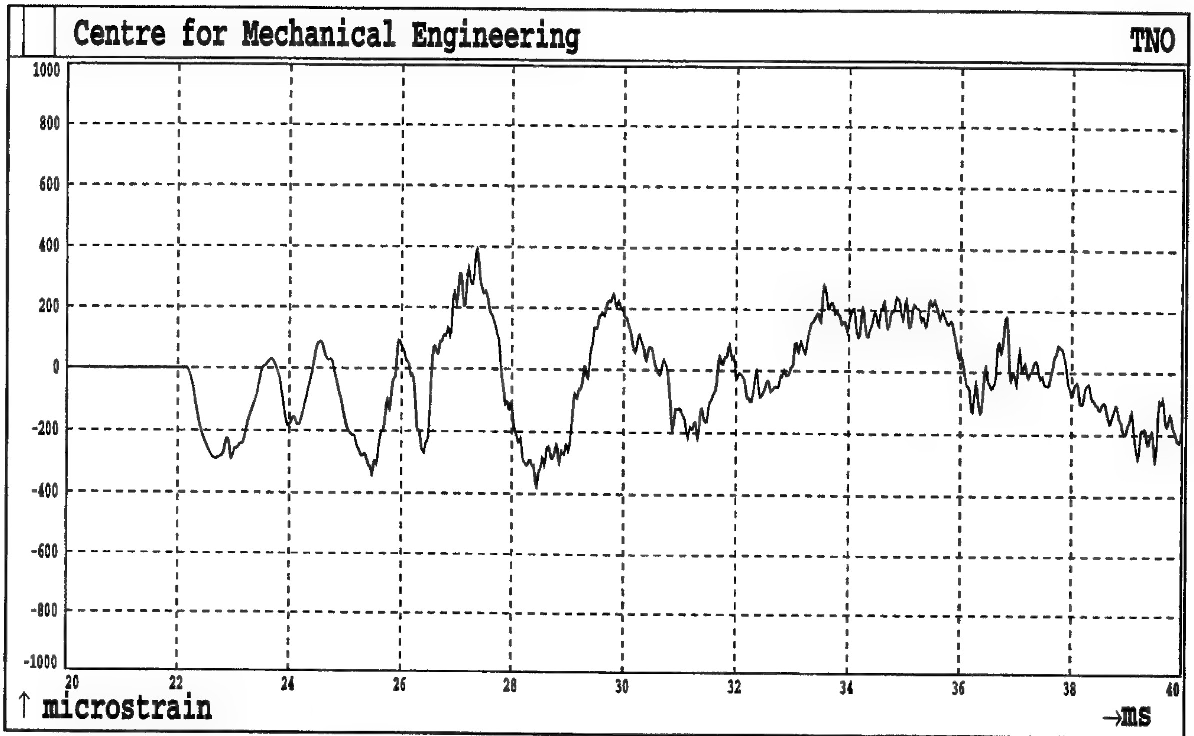


Fig.1A47. Shot 1 Sensor S23

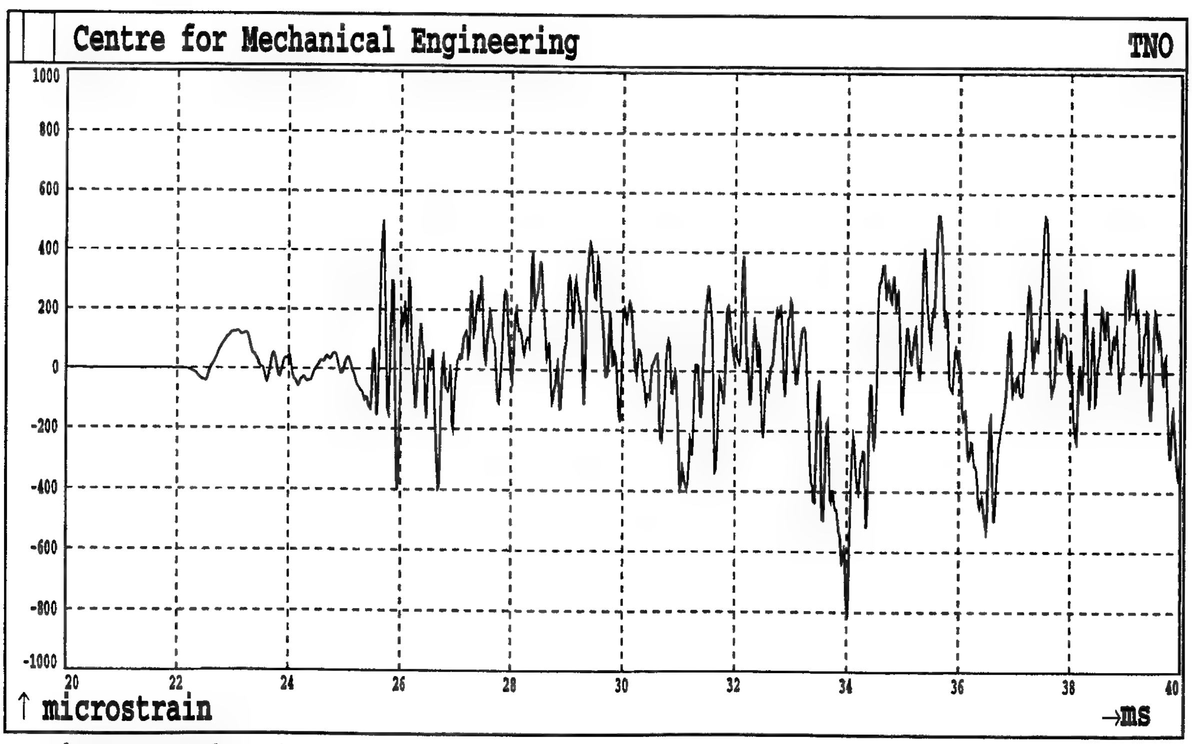


Fig.1A48. Shot 1 Sensor S24

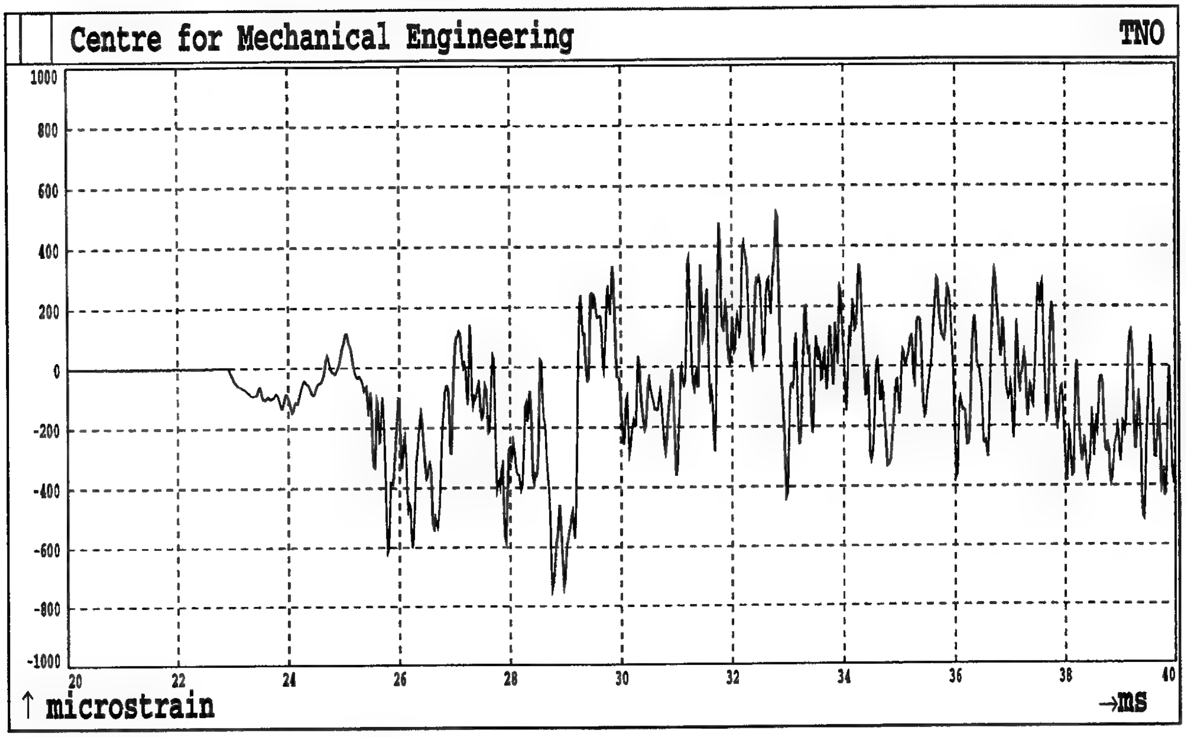


Fig.1A49. Shot 1 Sensor S25

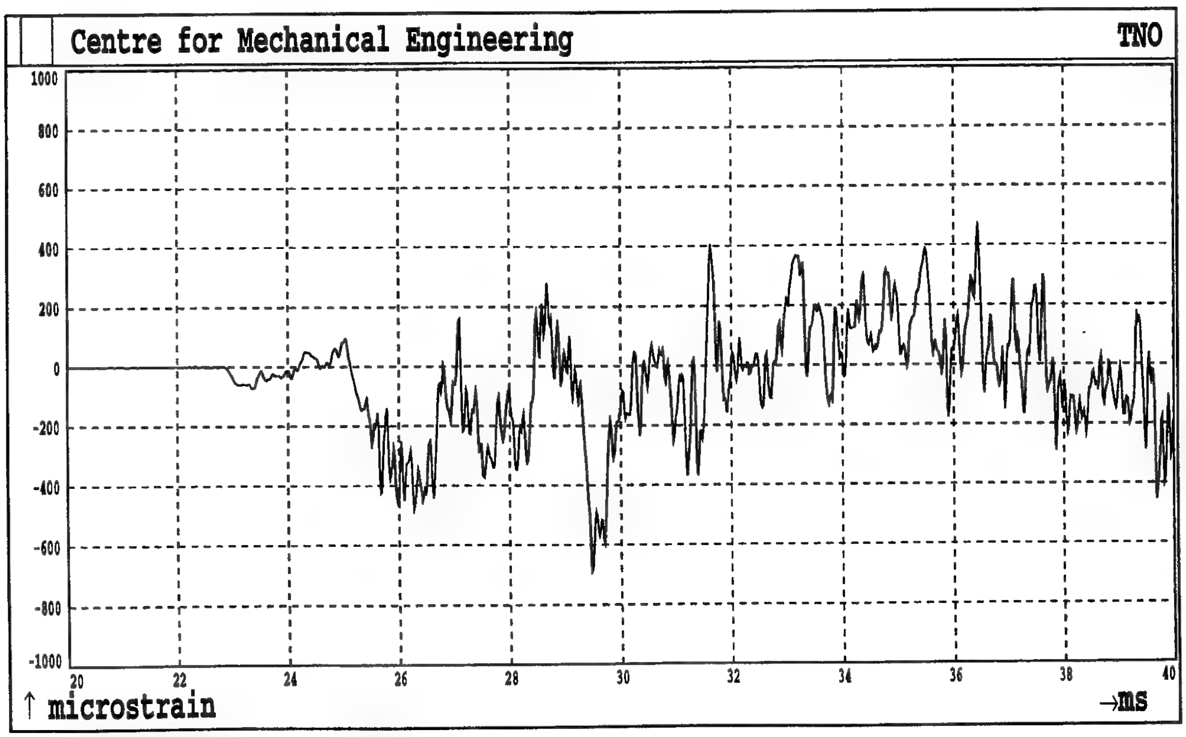


Fig.1A50. Shot 1 Sensor S26

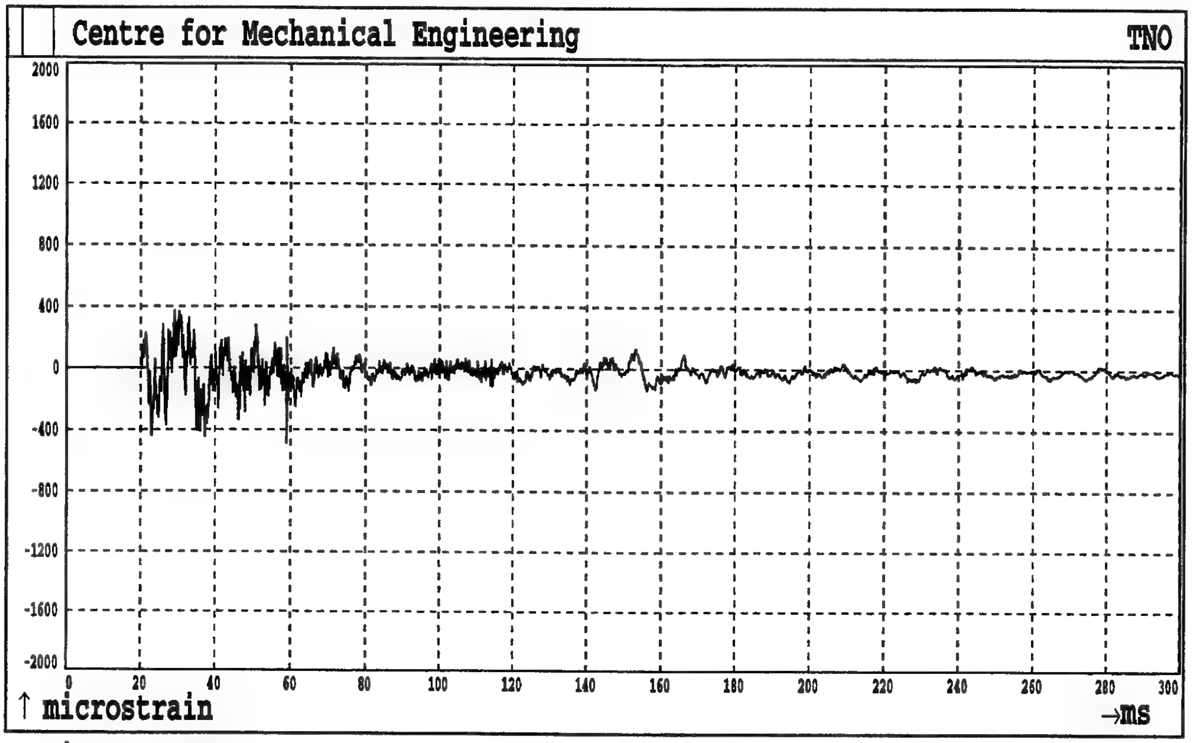


Fig.2A1. Shot 2 Sensor S1

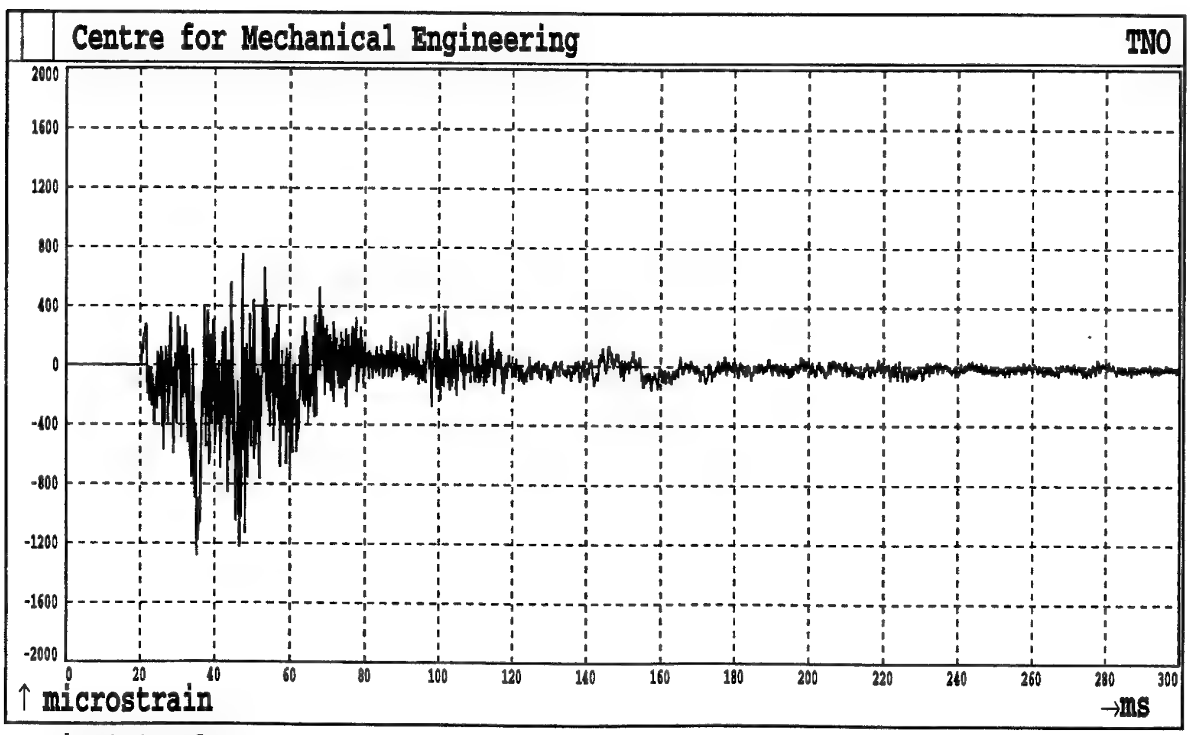


Fig.2A2. Shot 2 Sensor S2

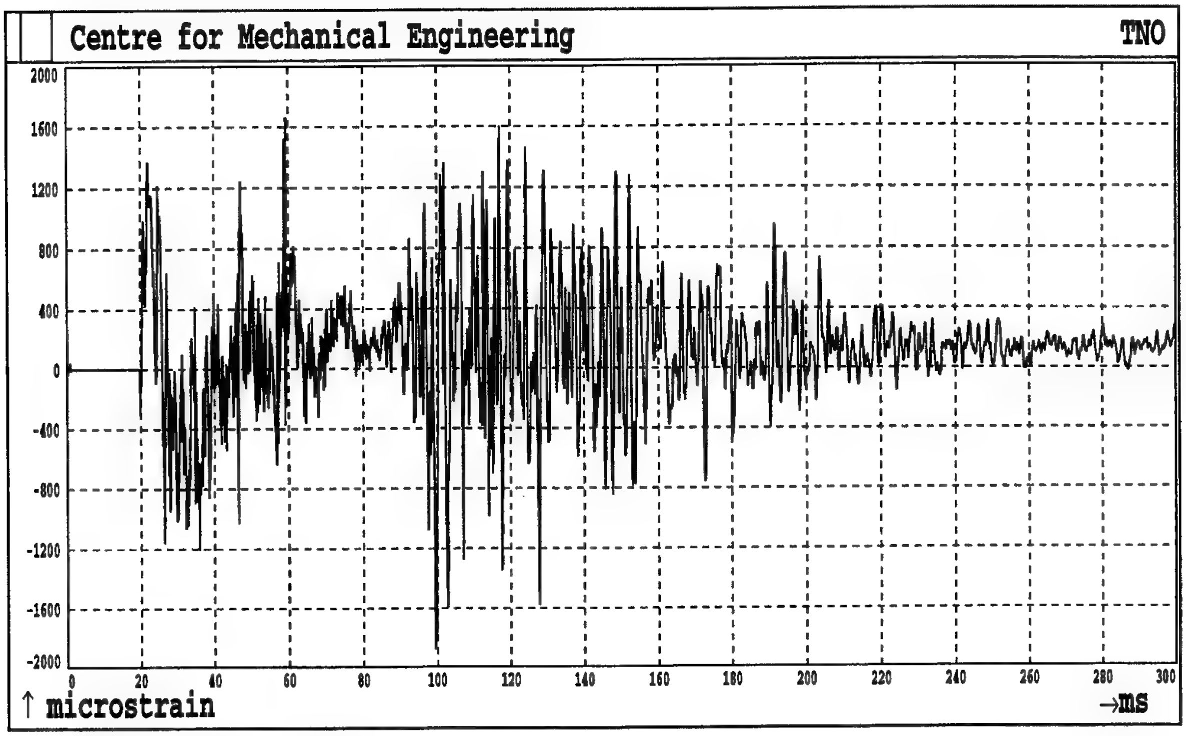


Fig.2A3. Shot 2 Sensor S3

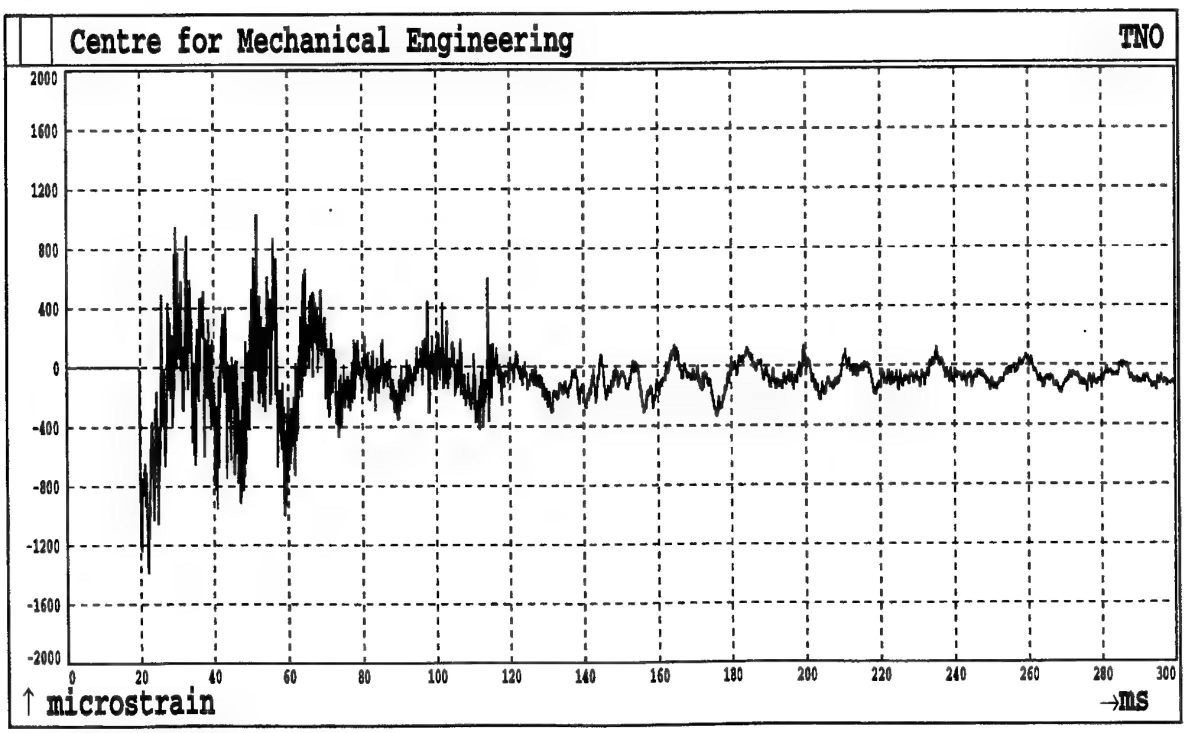


Fig.2A4. Shot 2 Sensor S4

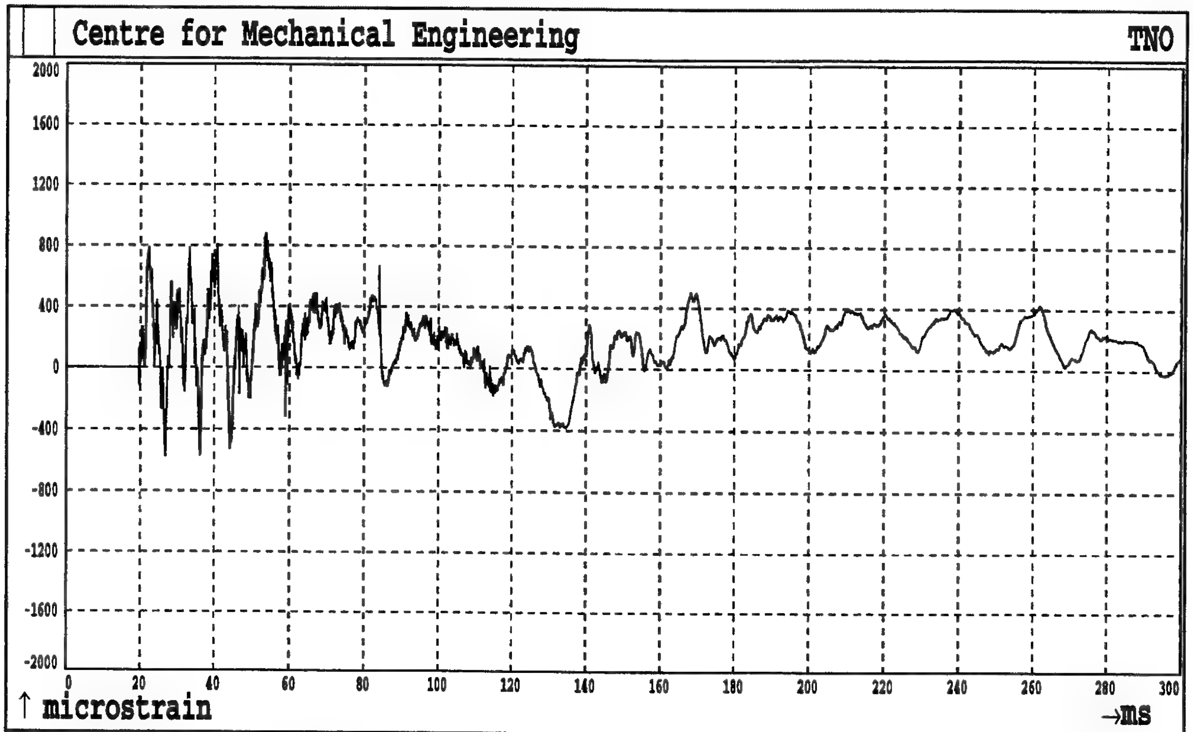


Fig.2A5. Shot 2 Sensor S5

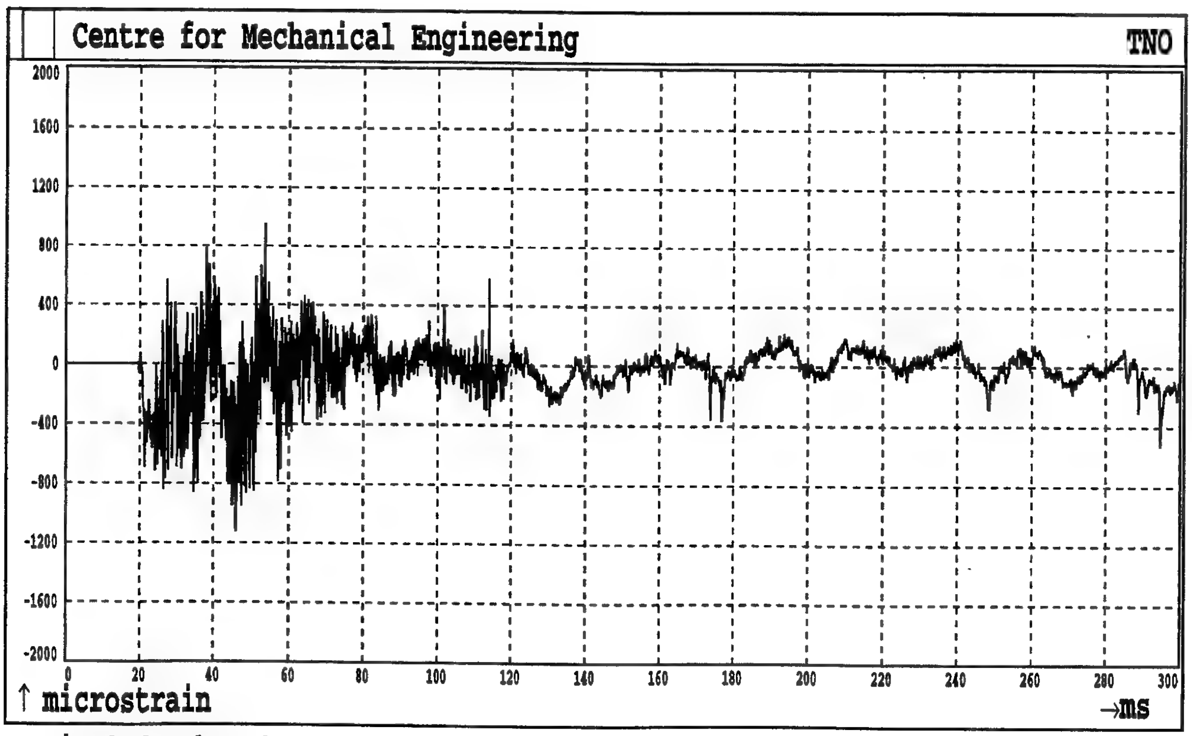


Fig.2A6. Shot 2 Sensor S6

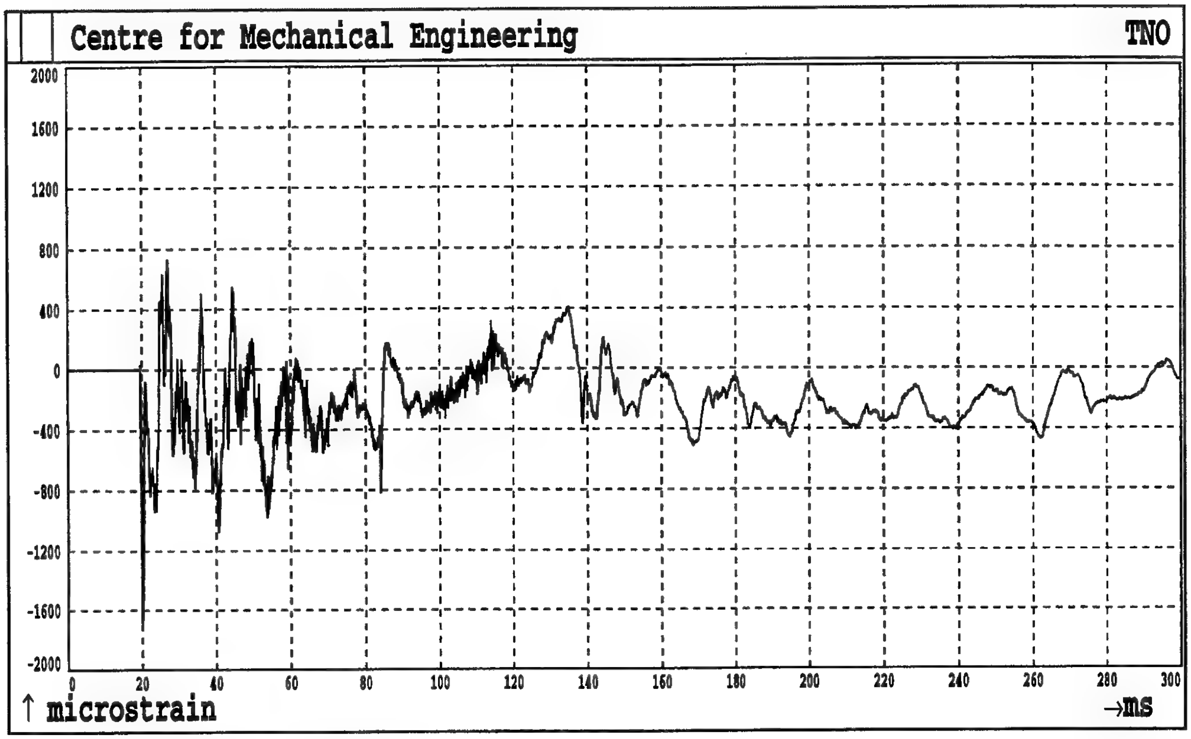


Fig.2A7. Shot 2 Sensor S7

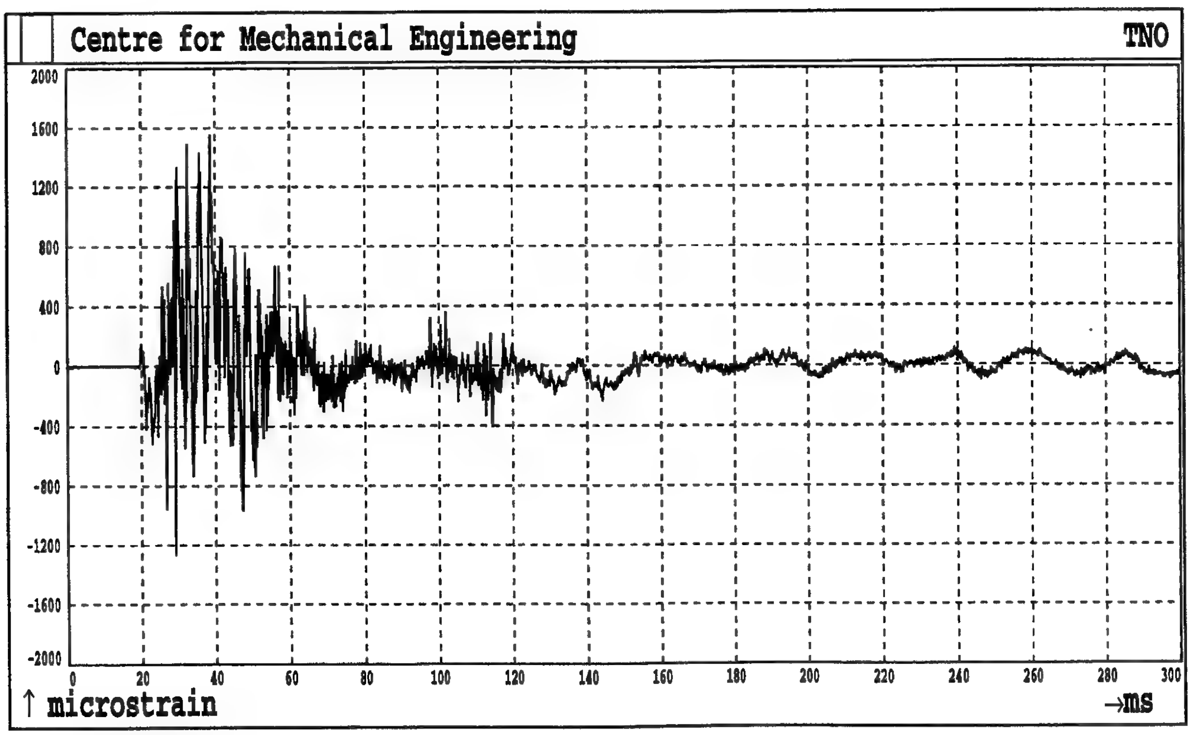


Fig.2A8. Shot 2 Sensor S8

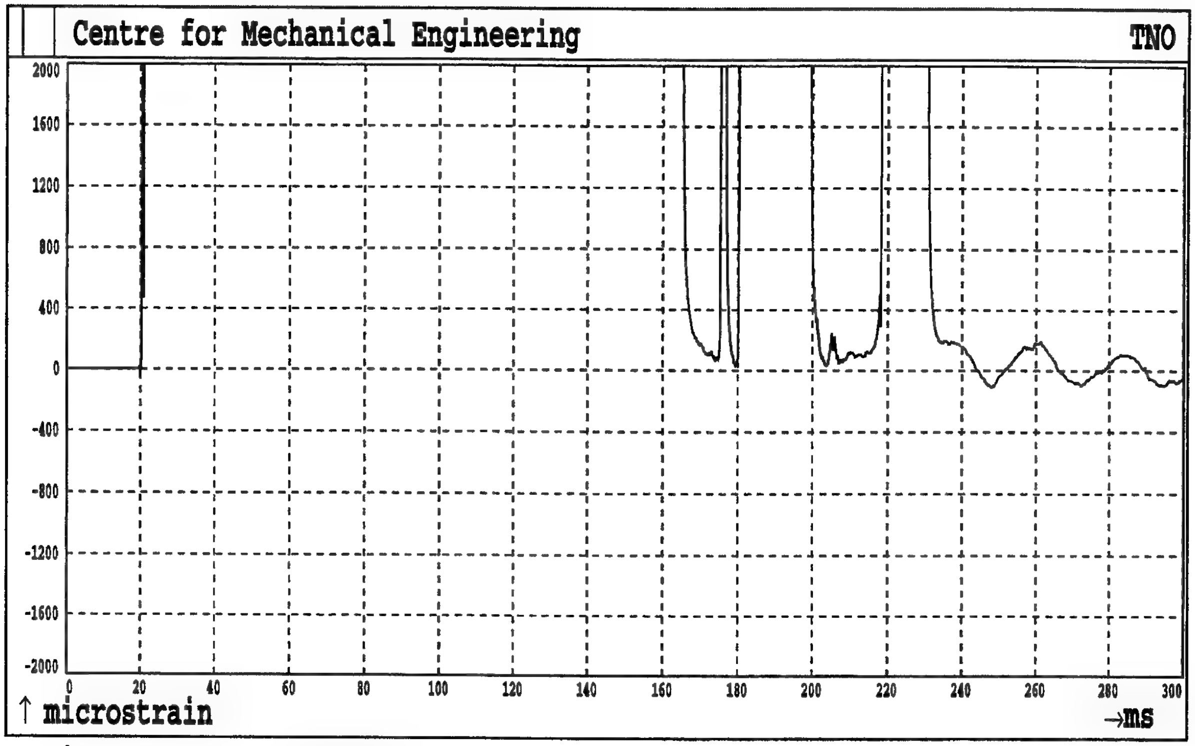


Fig.2A9. Shot 2 Sensor S10

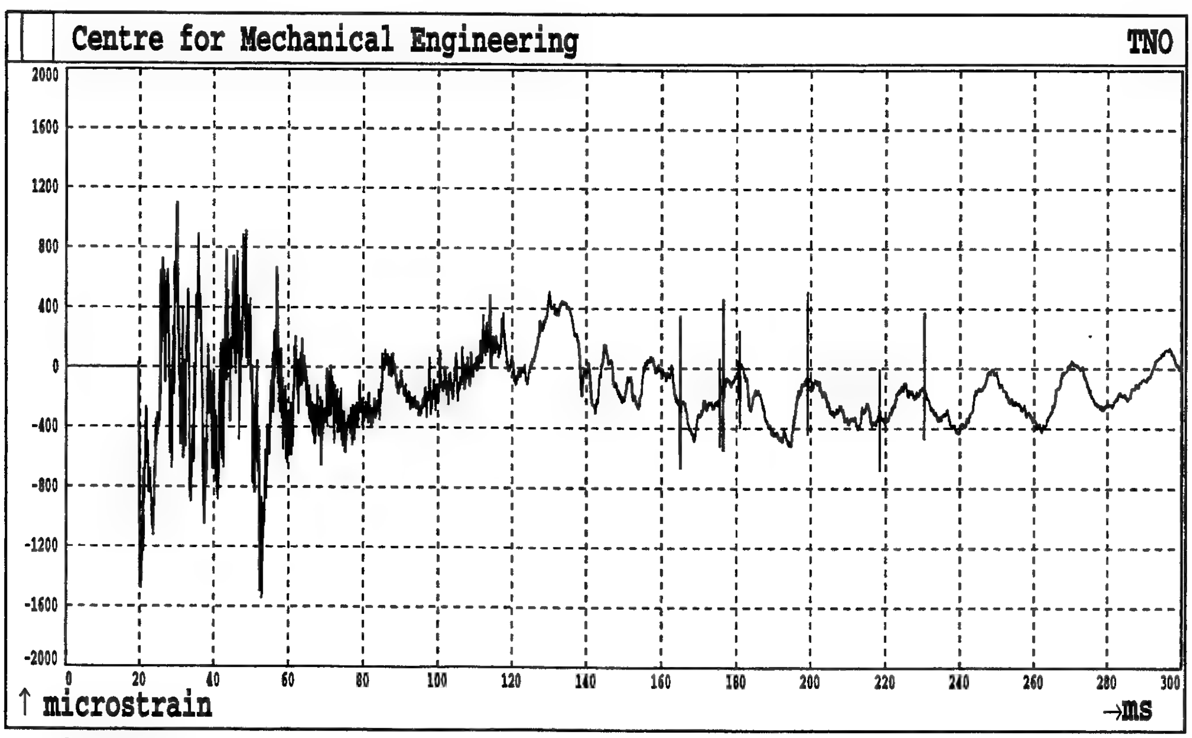


Fig.2A10. Shot 2 Sensor S11

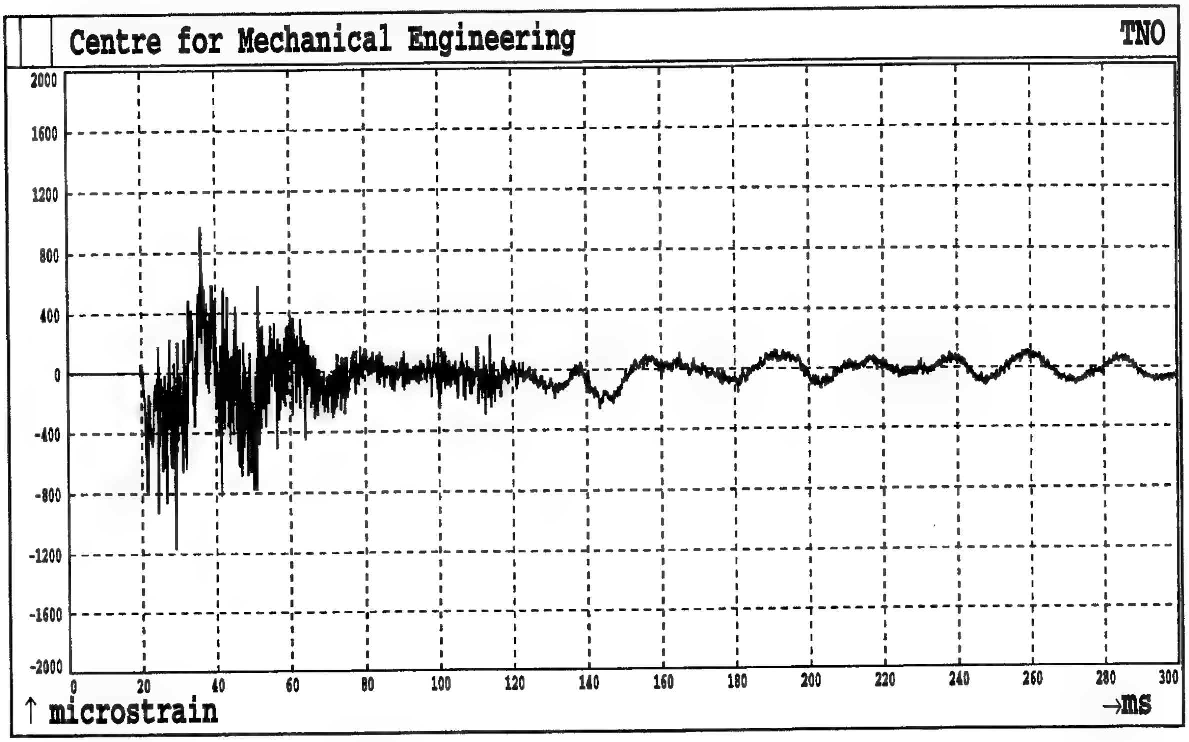


Fig.2A11. Shot 2 Sensor S12

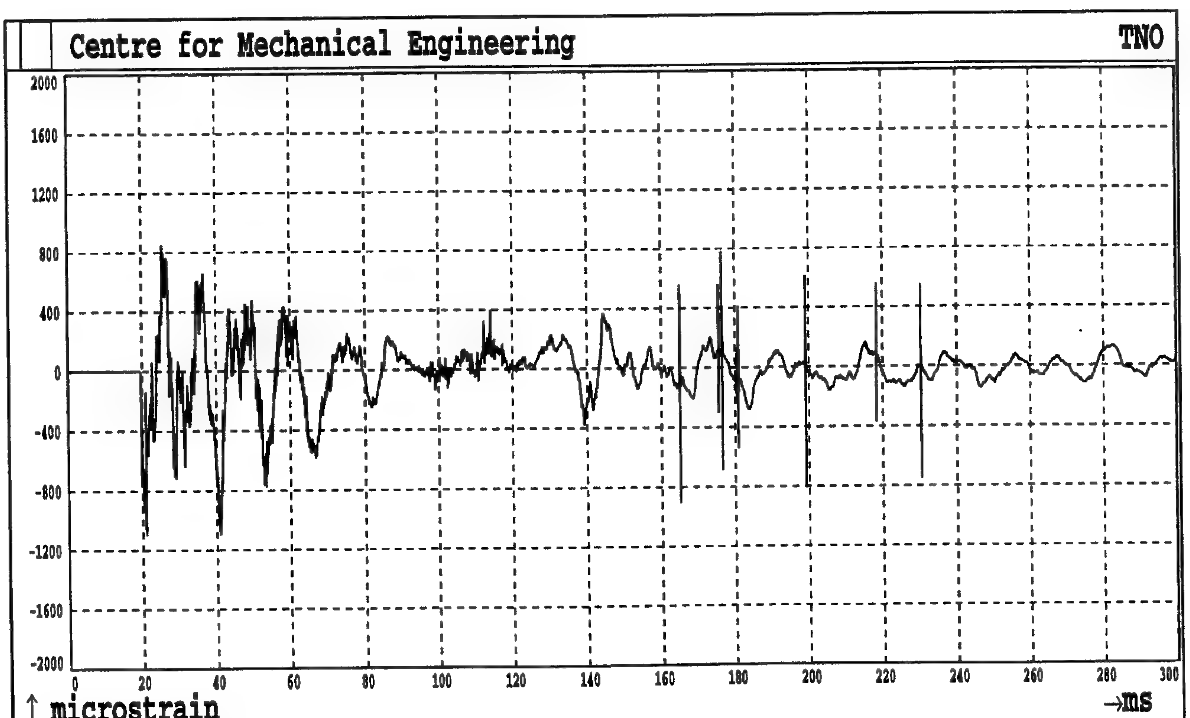


Fig.2A12. Shot 2 Sensor S13

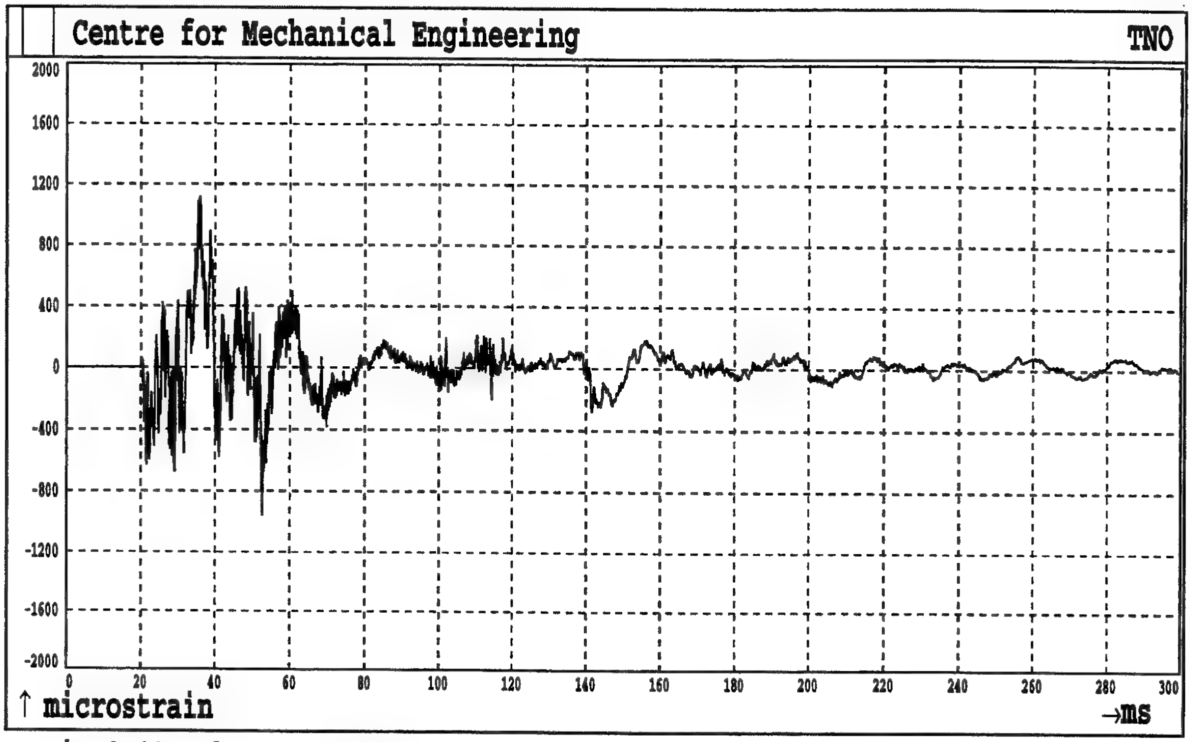


Fig.2A13. Shot 2 Sensor S14

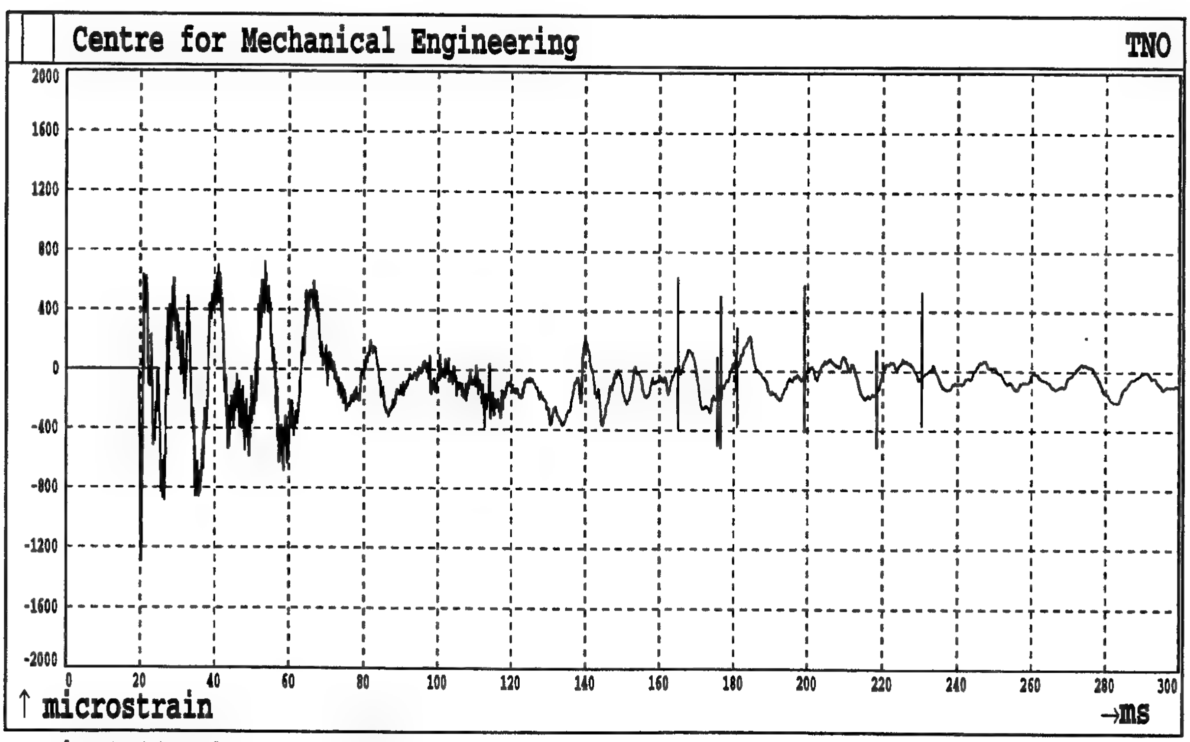


Fig.2A14. Shot 2 Sensor S15

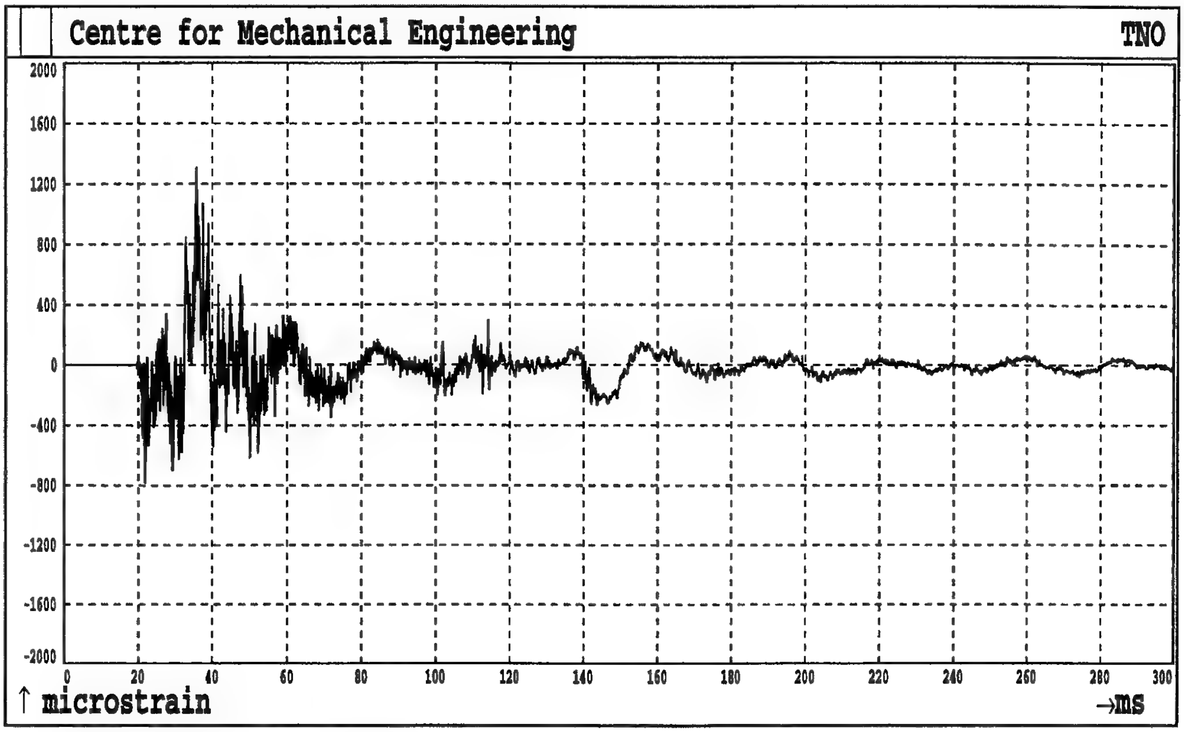


Fig.2A15. Shot 2 Sensor S16

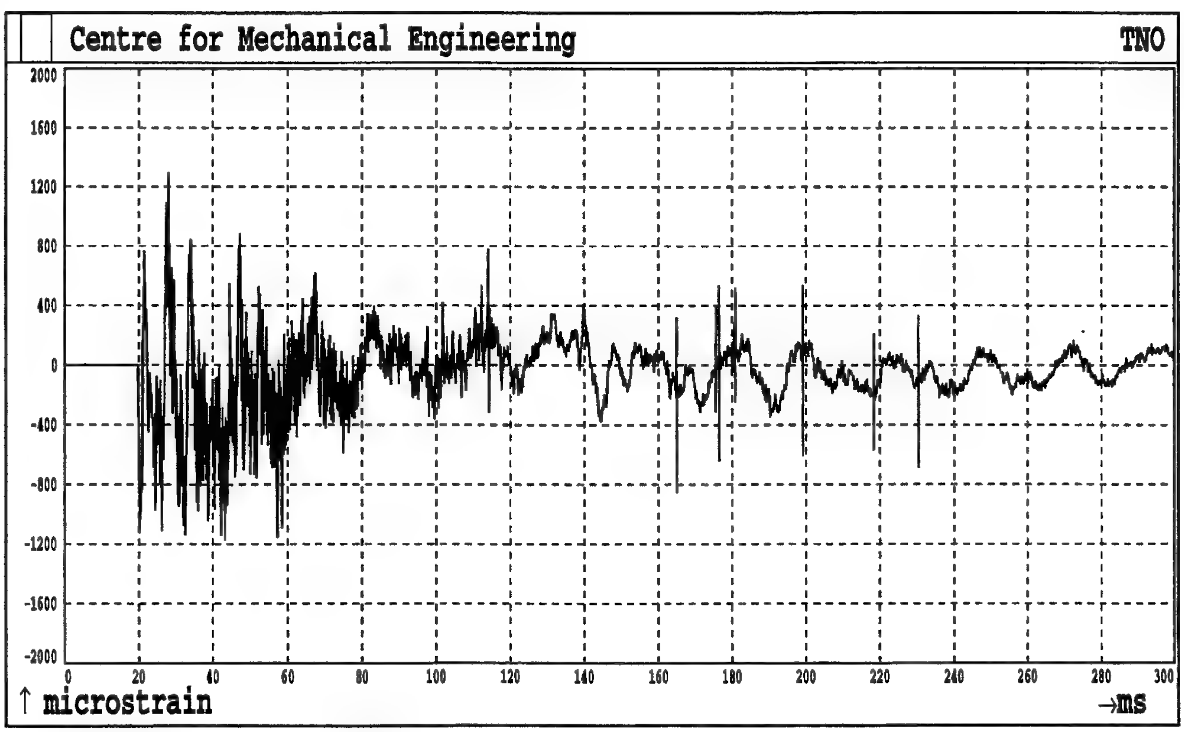


Fig.2A16. Shot 2 Sensor S17

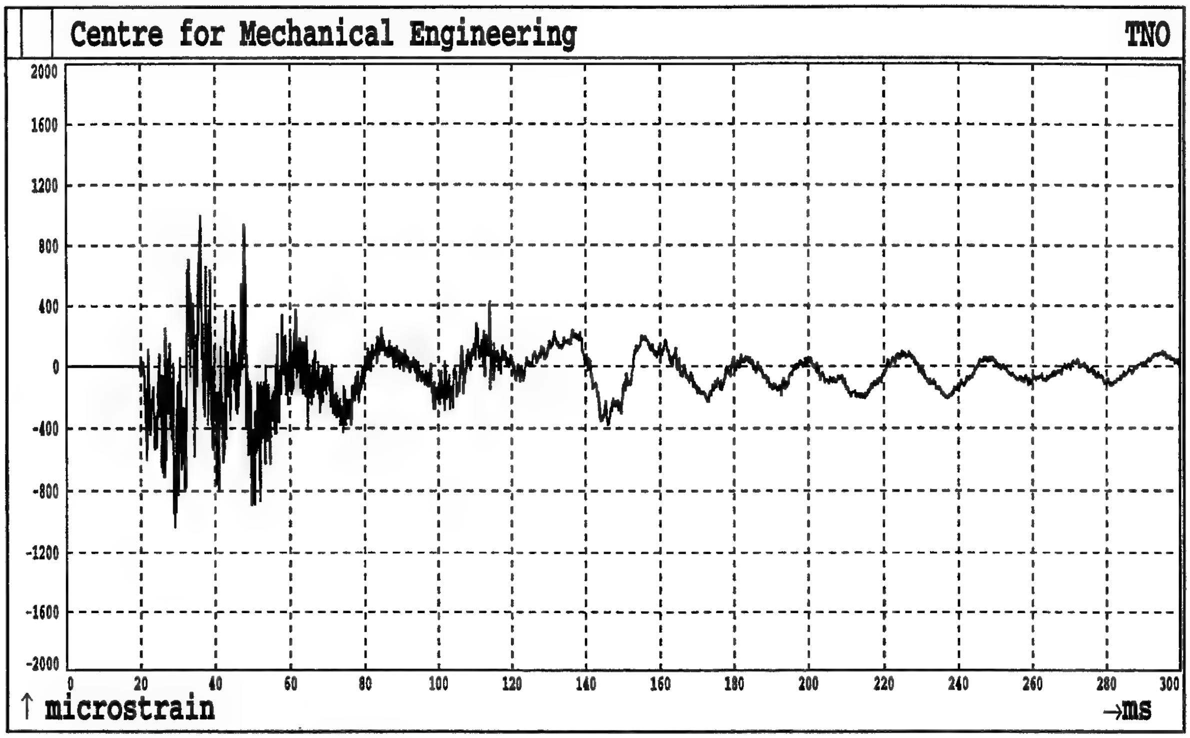


Fig.2A17. Shot 2 Sensor S18

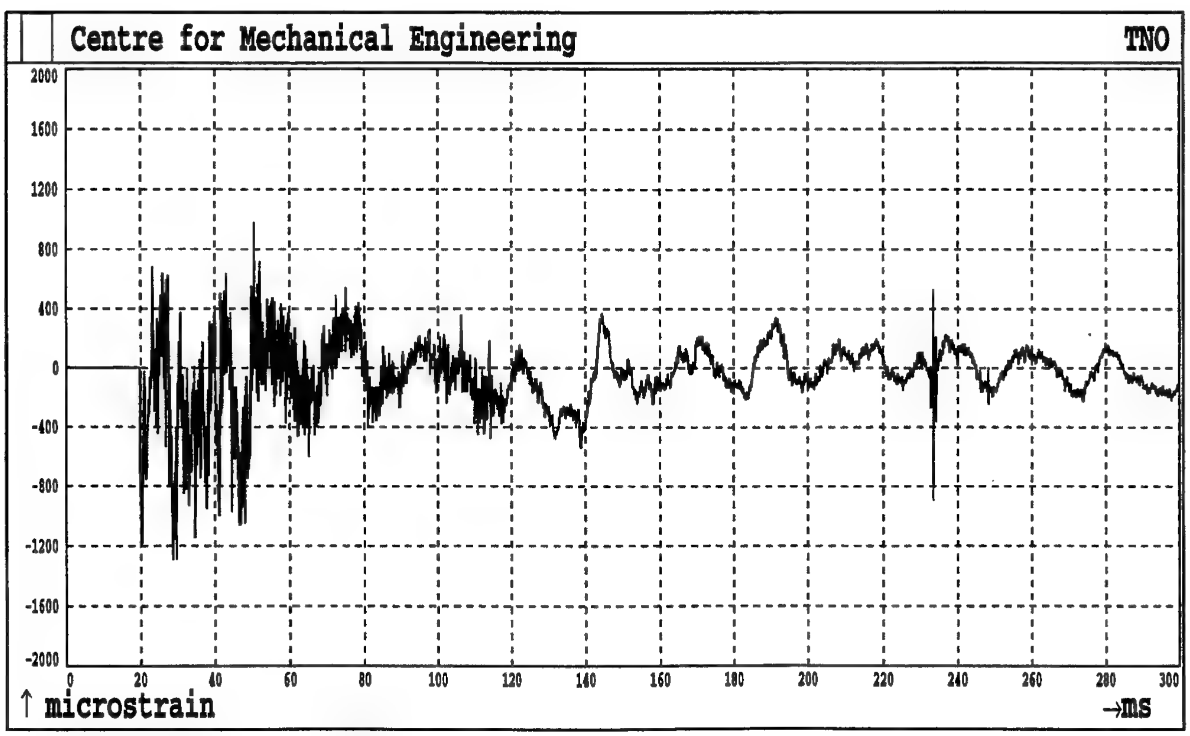


Fig.2A18. Shot 2 Sensor S19

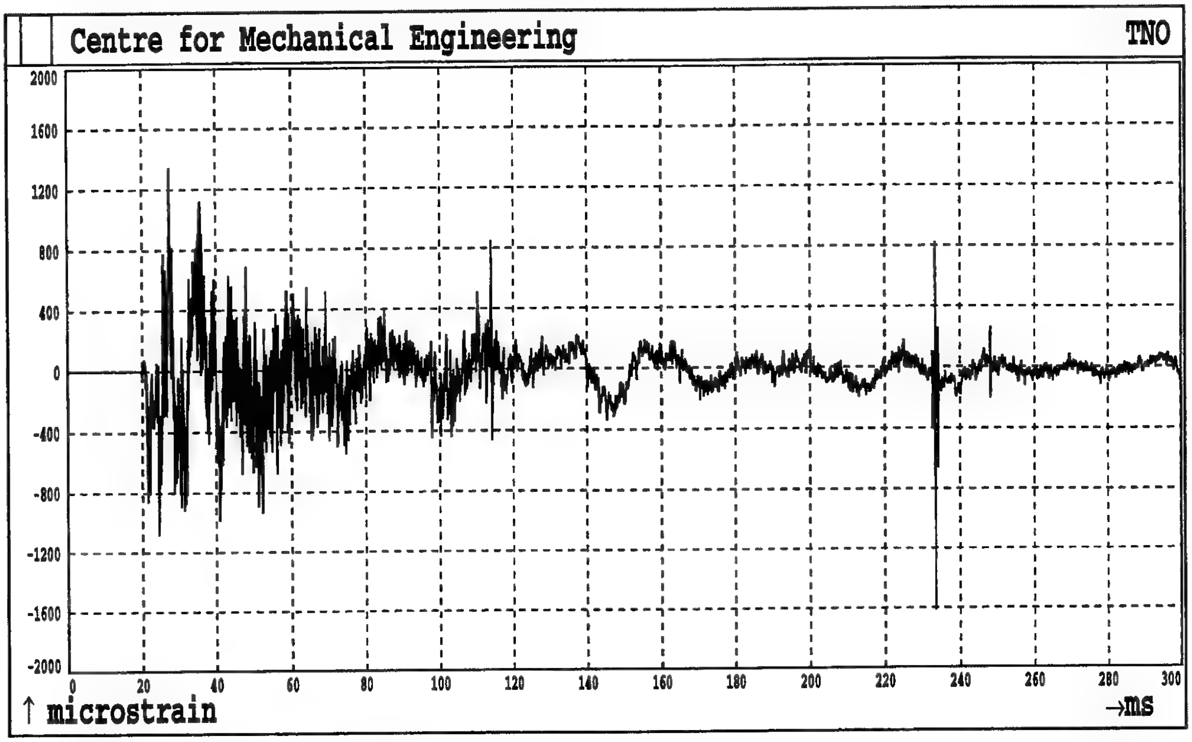


Fig.2A19. Shot 2 Sensor S20

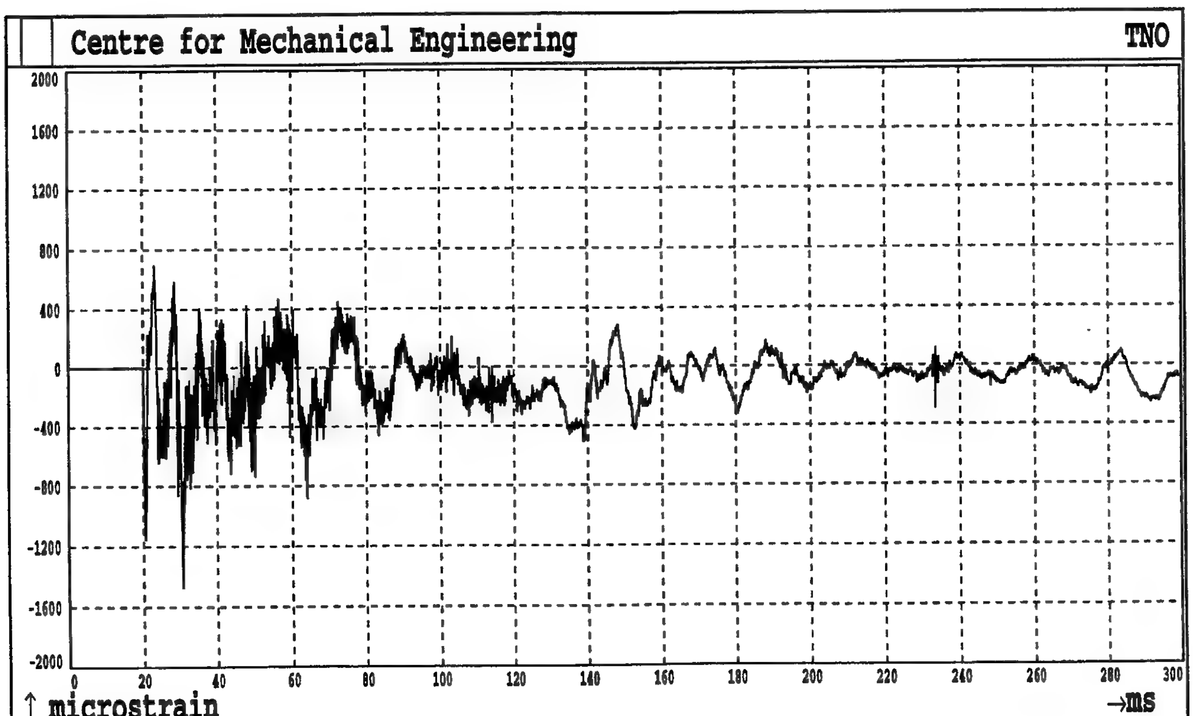


Fig.2A20. Shot 2 Sensor S21

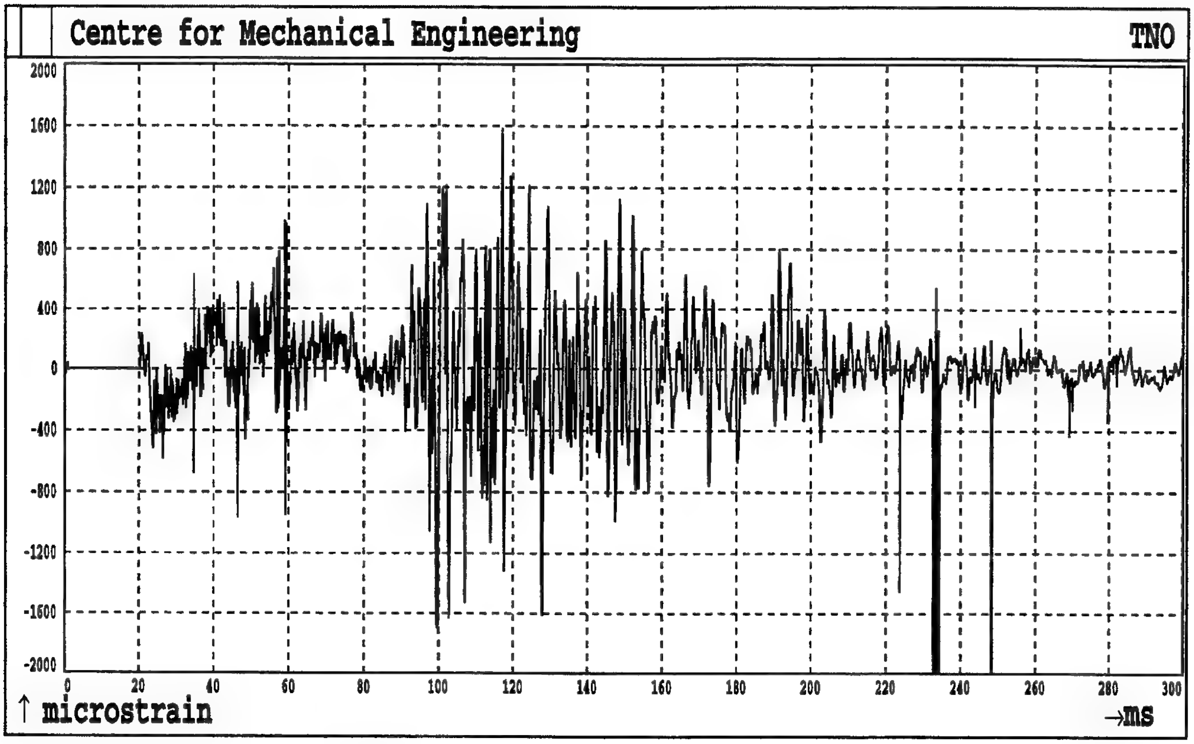


Fig.2A21. Shot 2 Sensor S22

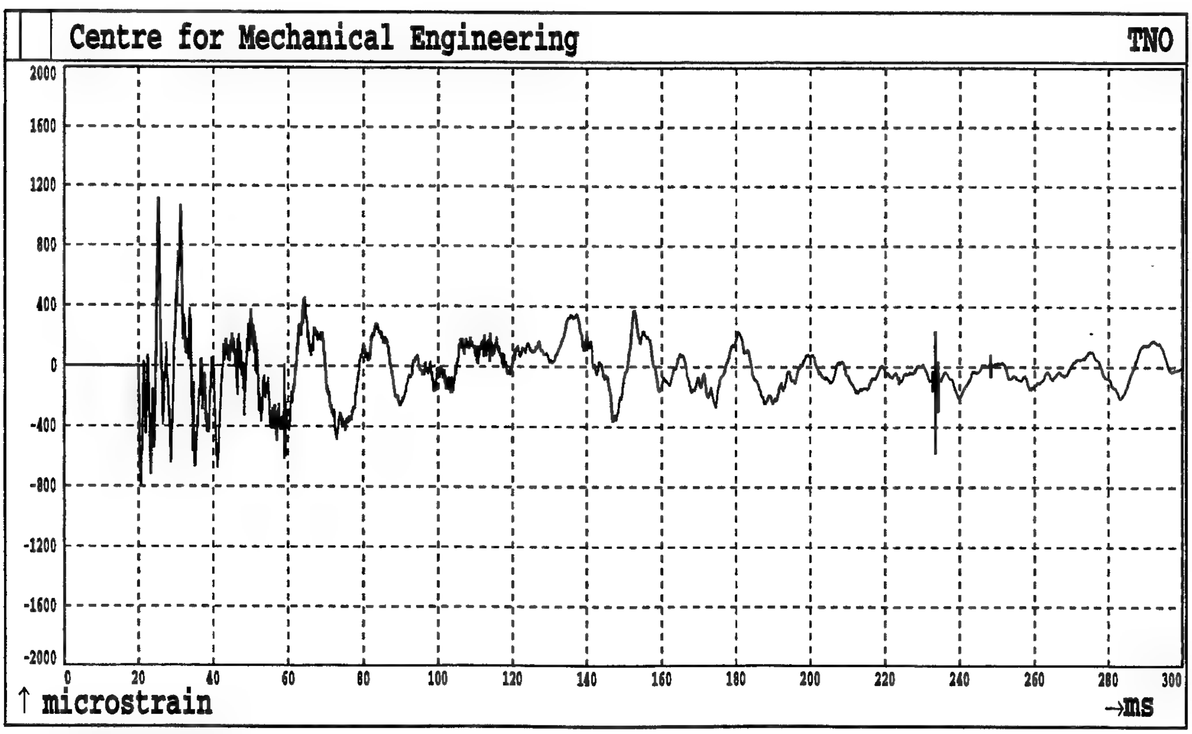


Fig.2A22. Shot 2 Sensor S23

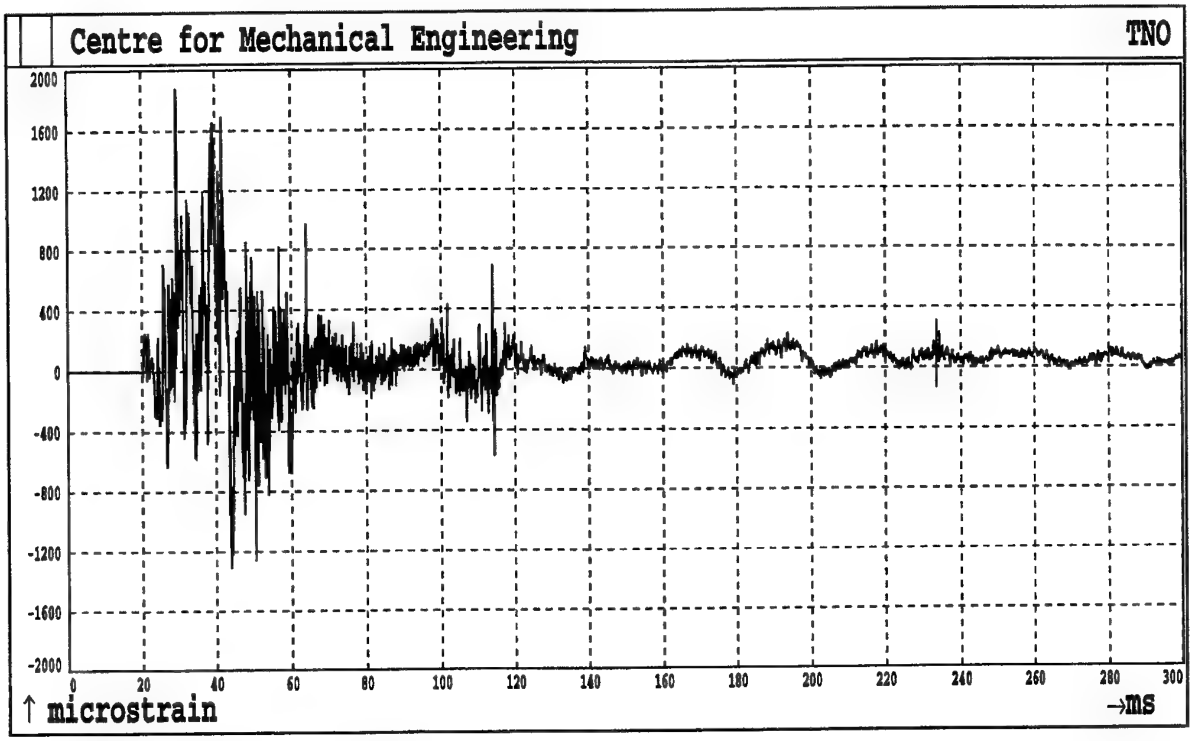


Fig.2A23. Shot 2 Sensor S24

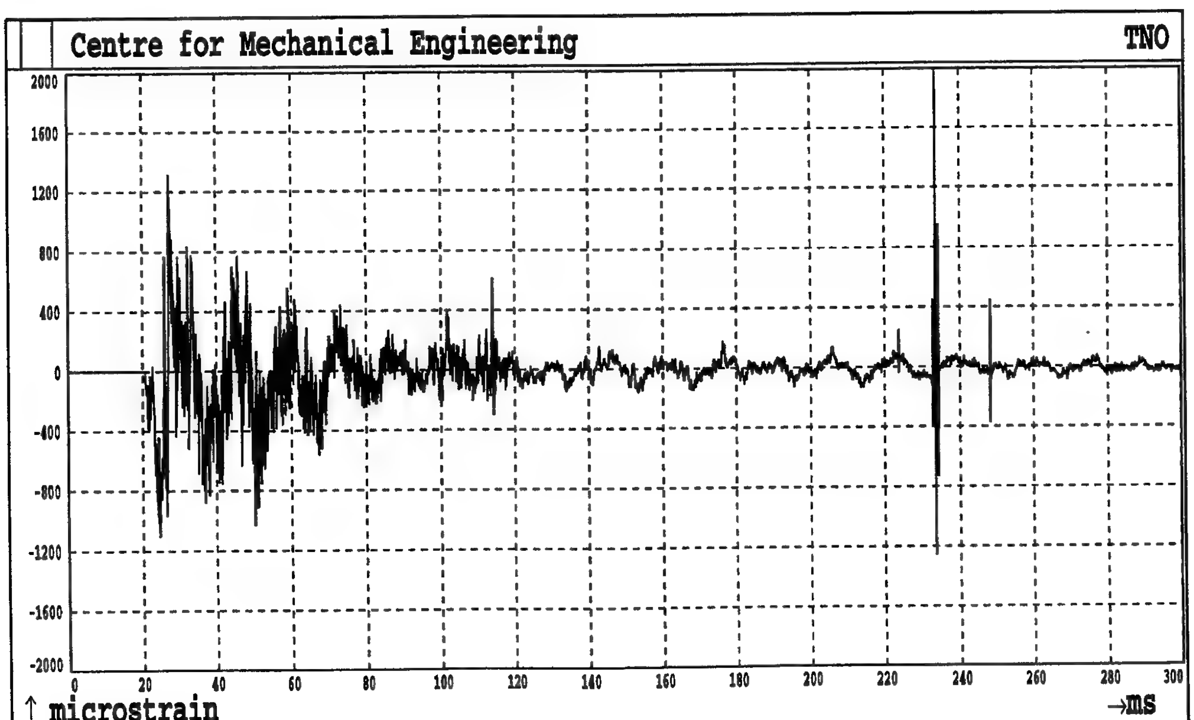


Fig.2A24. Shot 2 Sensor S25

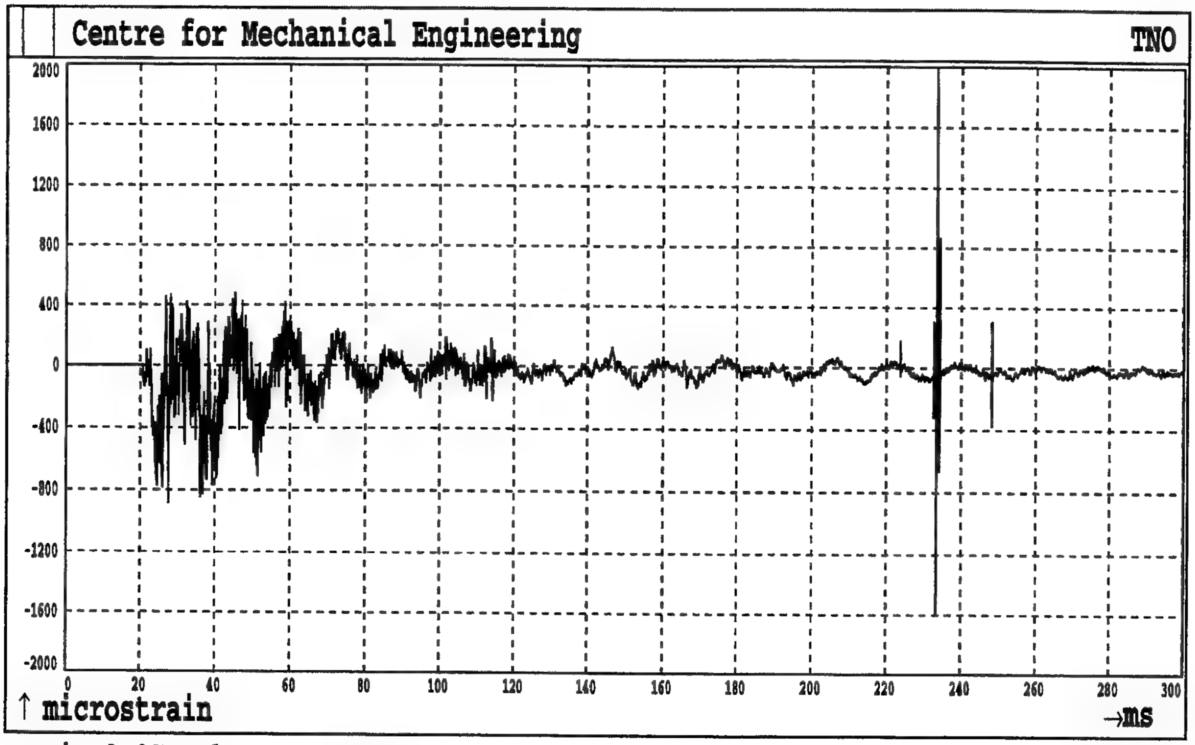


Fig.2A25. Shot 2 Sensor S26

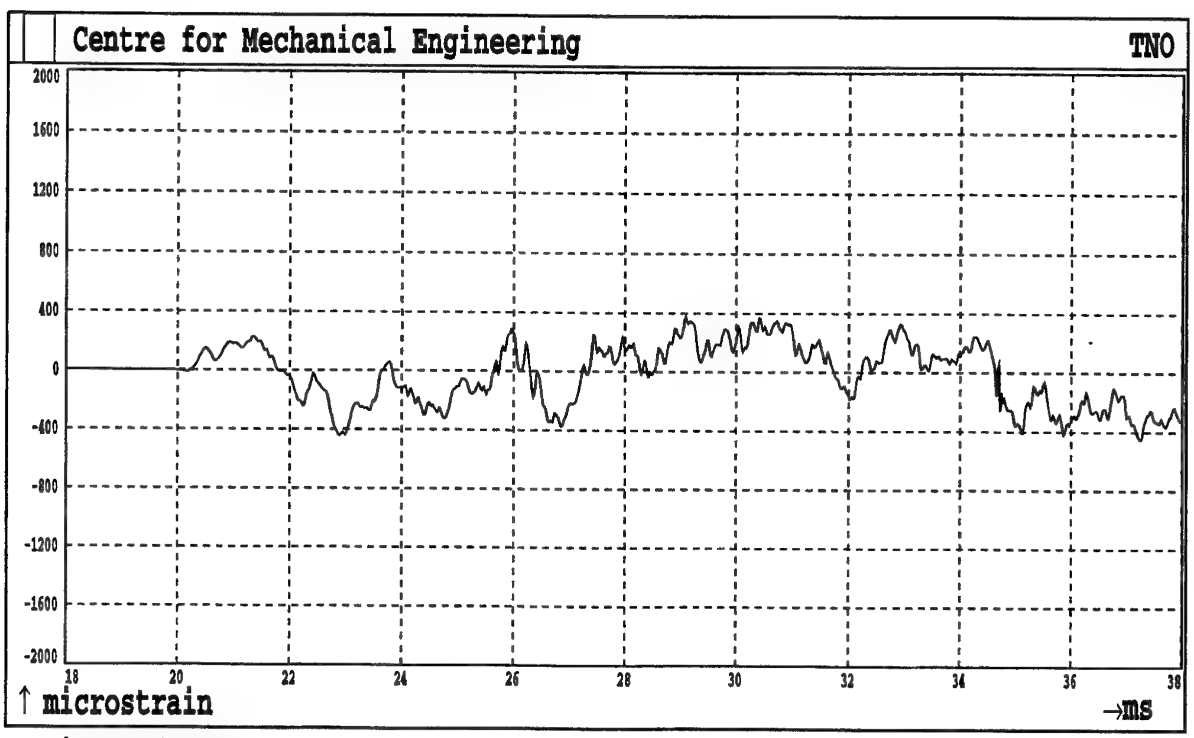


Fig.2A26. Shot 2 Sensor S1

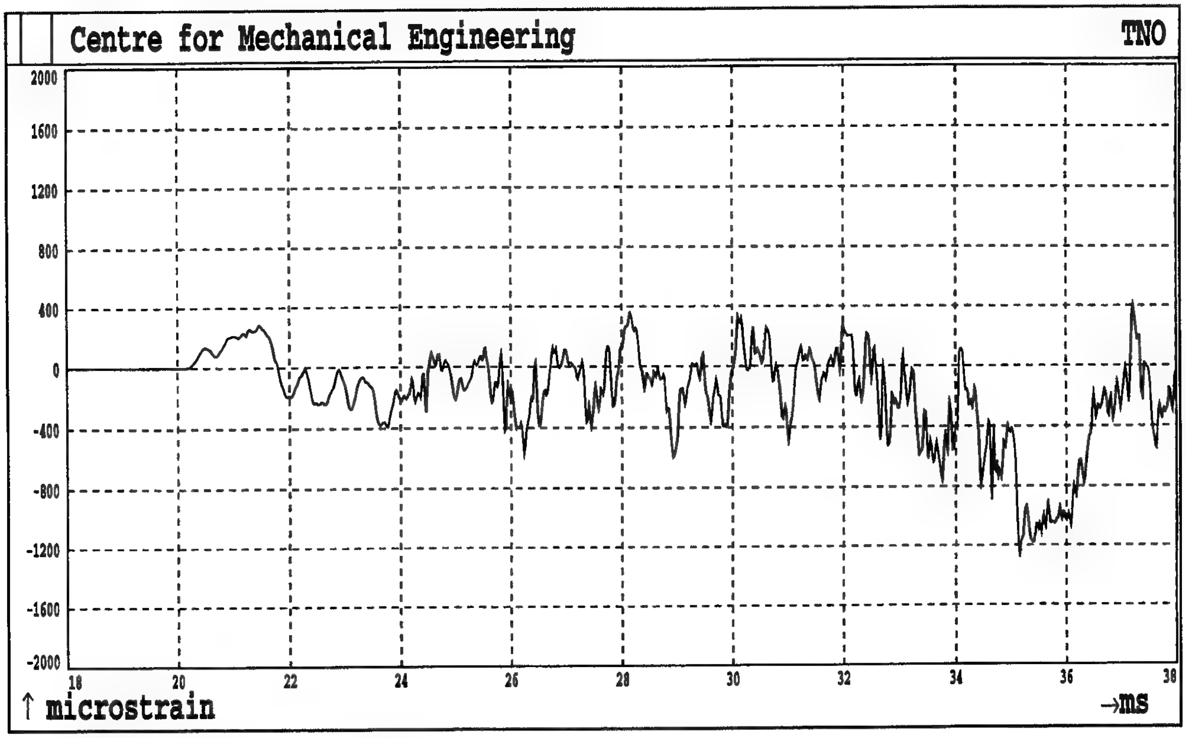


Fig.2A27. Shot 2 Sensor S2

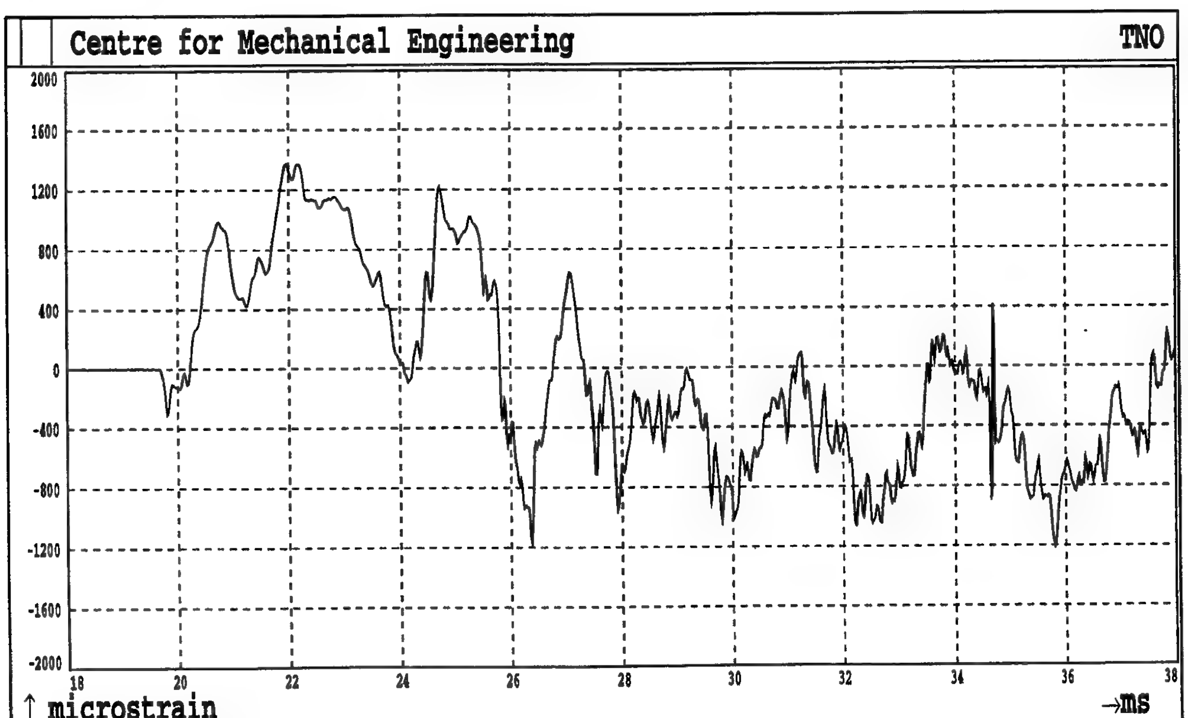


Fig.2A28. Shot 2 Sensor S3

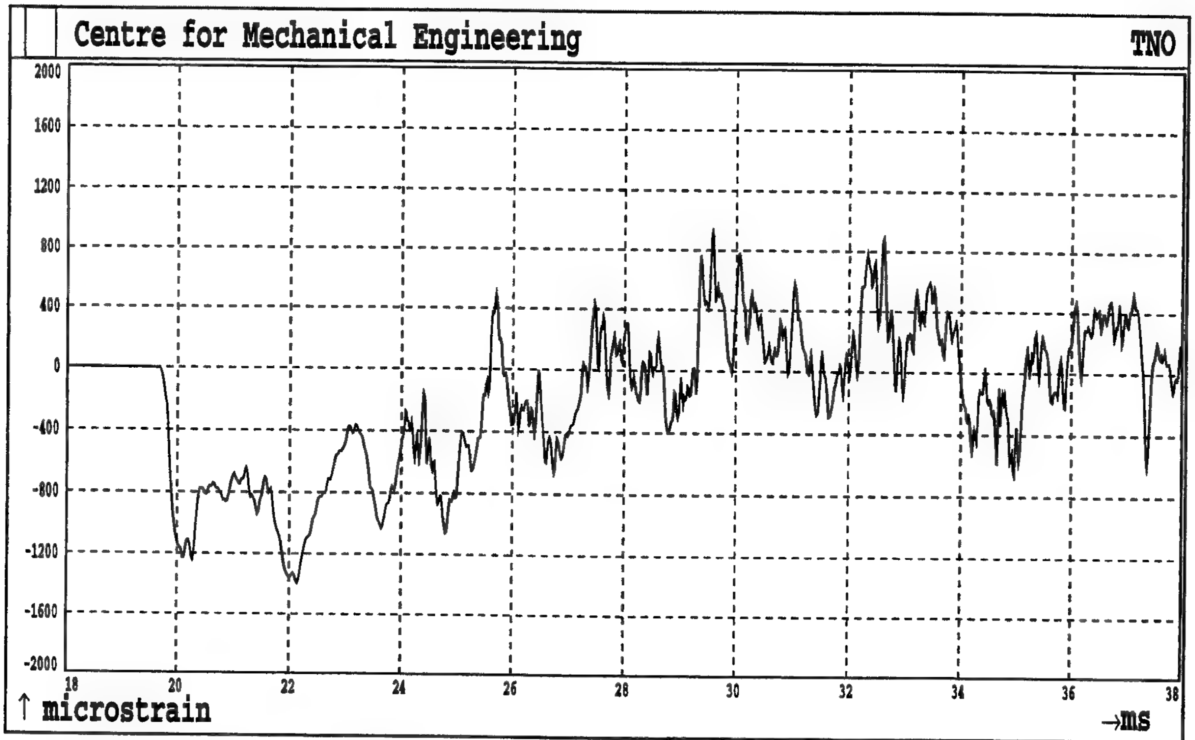


Fig.2A29. Shot 2 Sensor S4

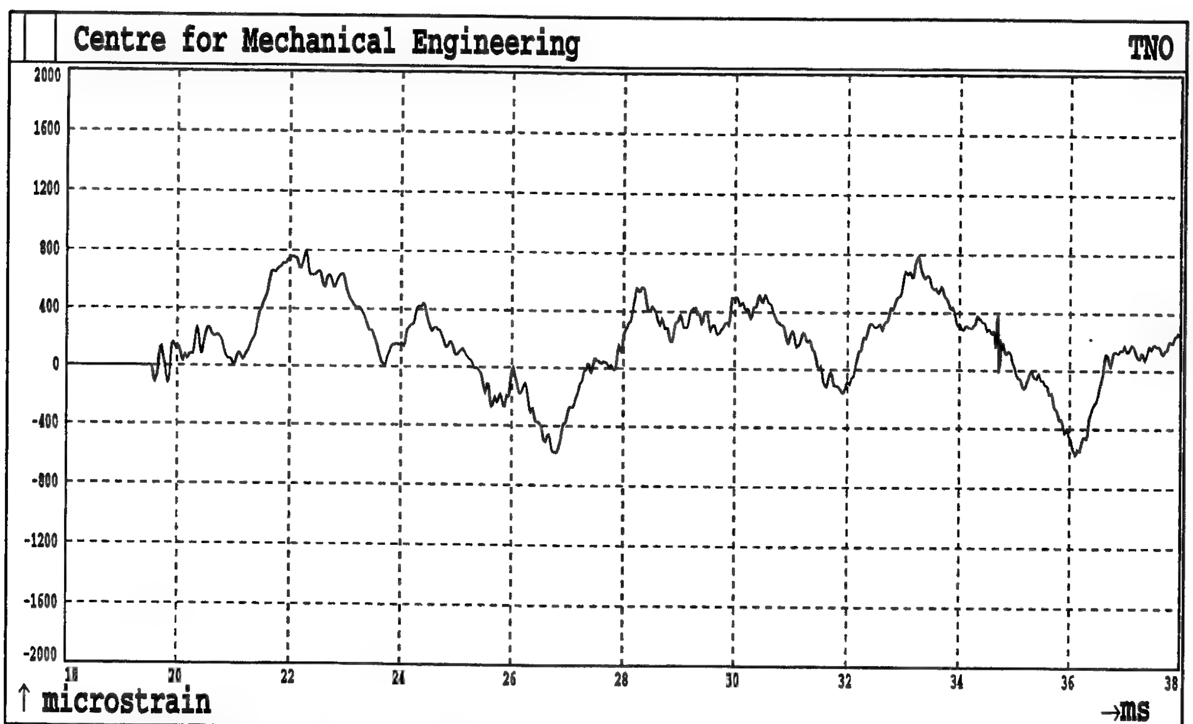


Fig.2A30. Shot 2 Sensor S5

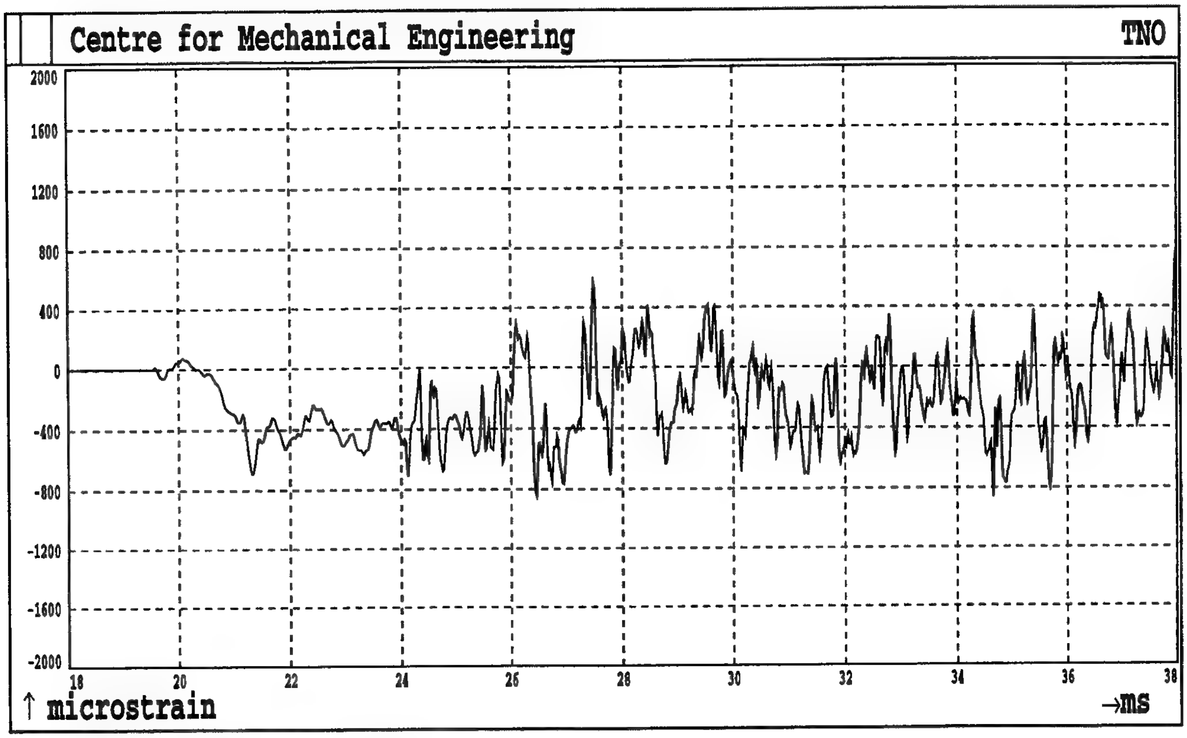


Fig.2A31. Shot 2 Sensor S6

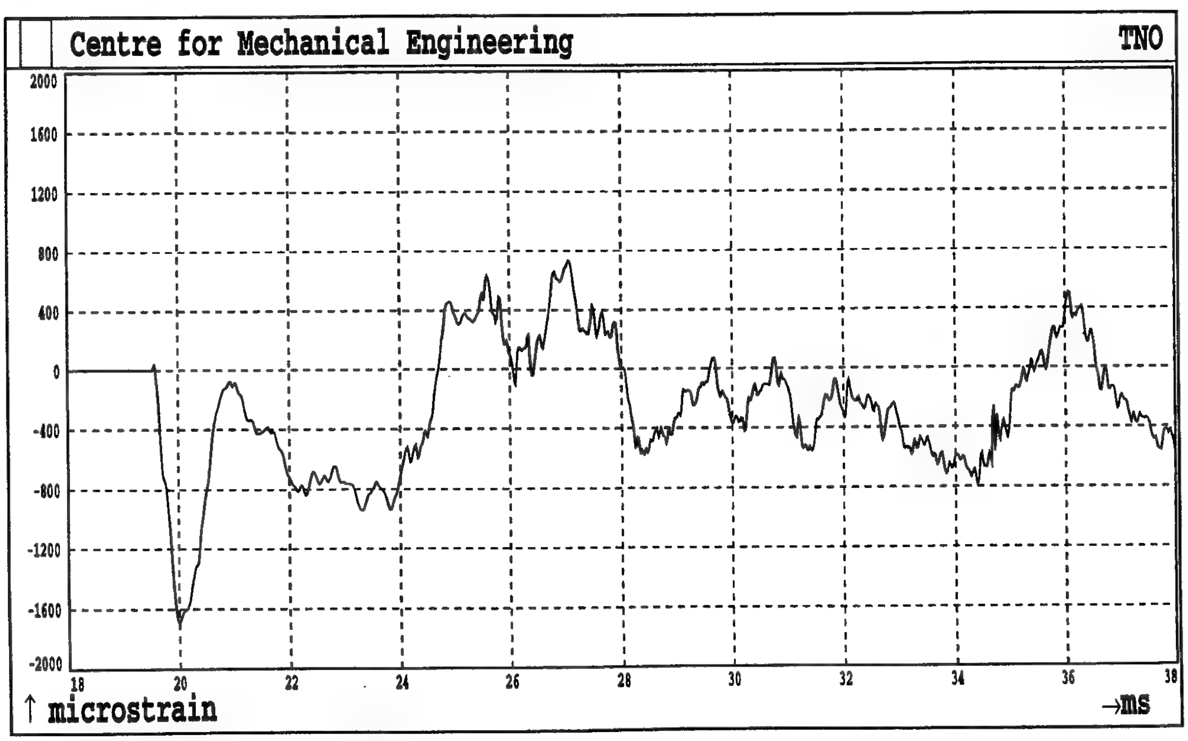


Fig.2A32. Shot 2 Sensor S7

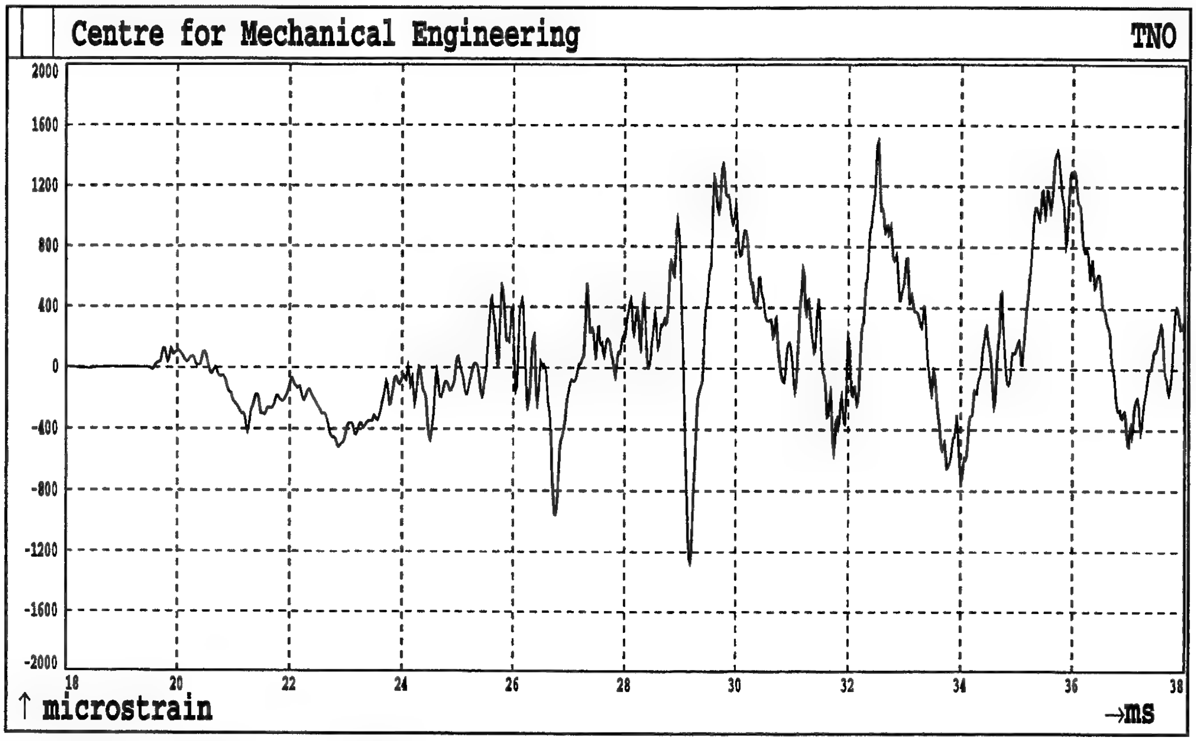


Fig.2A33. Shot 2 Sensor S8

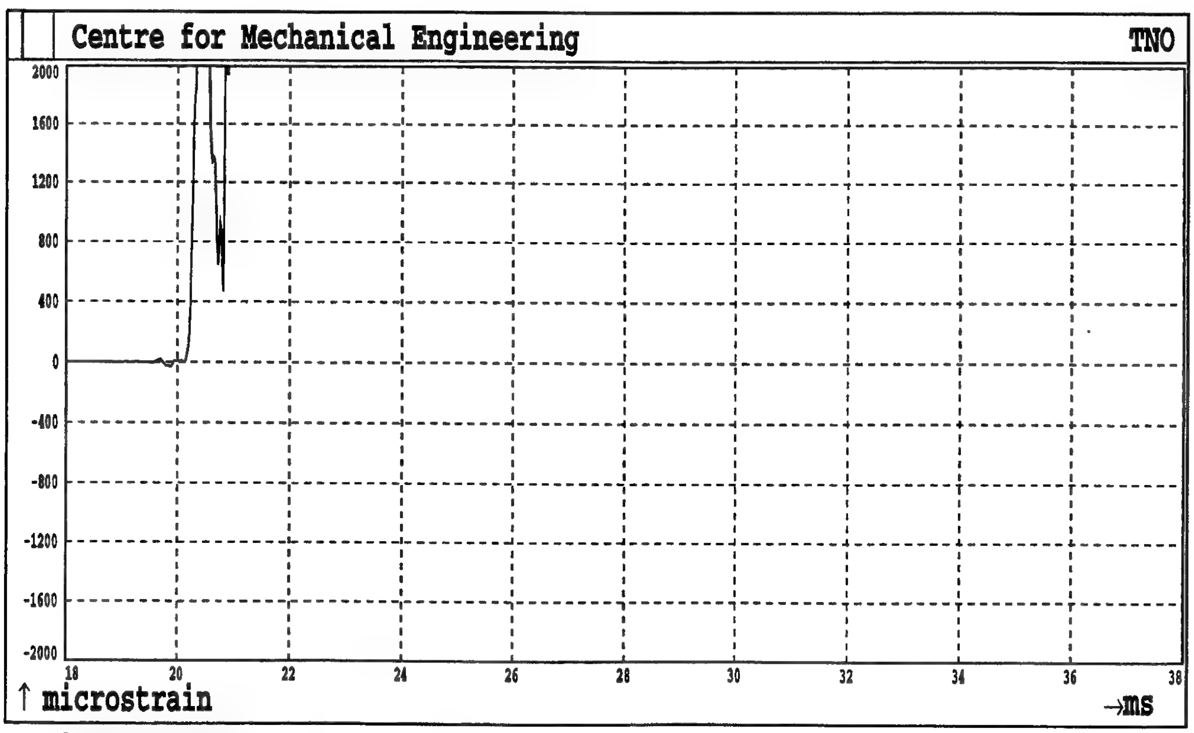


Fig.2A34. Shot 2 Sensor S10

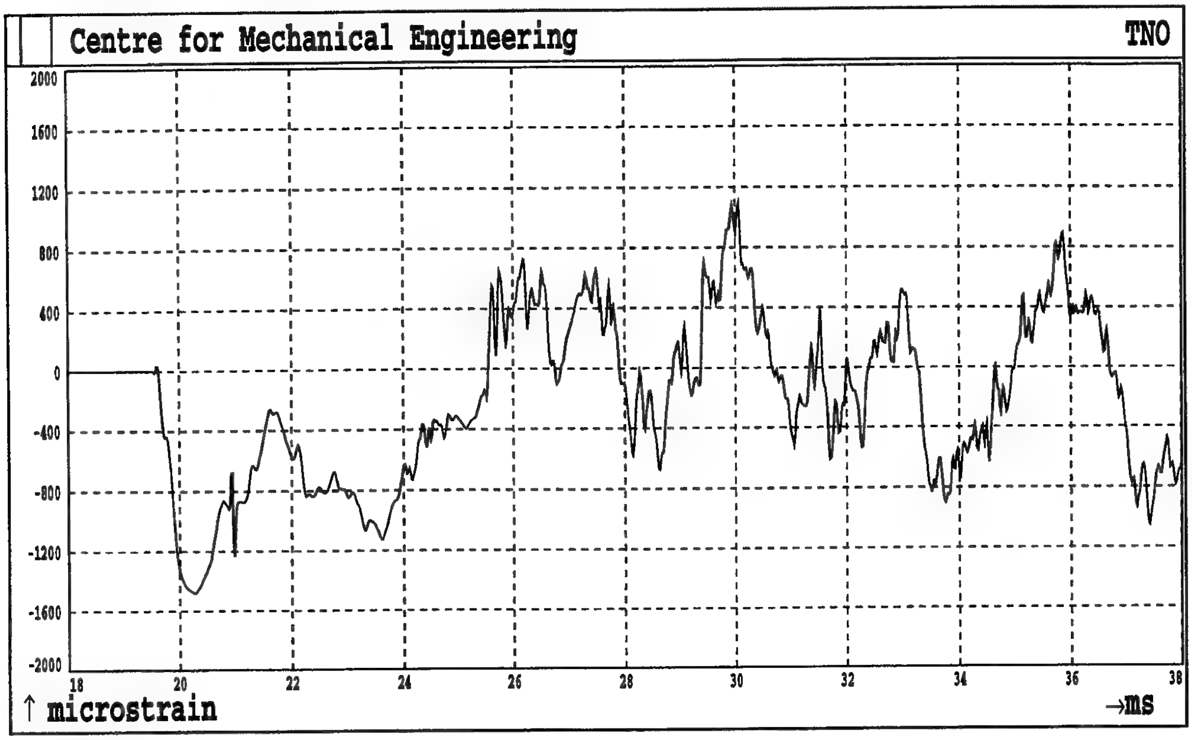


Fig.2A35. Shot 2 Sensor S11

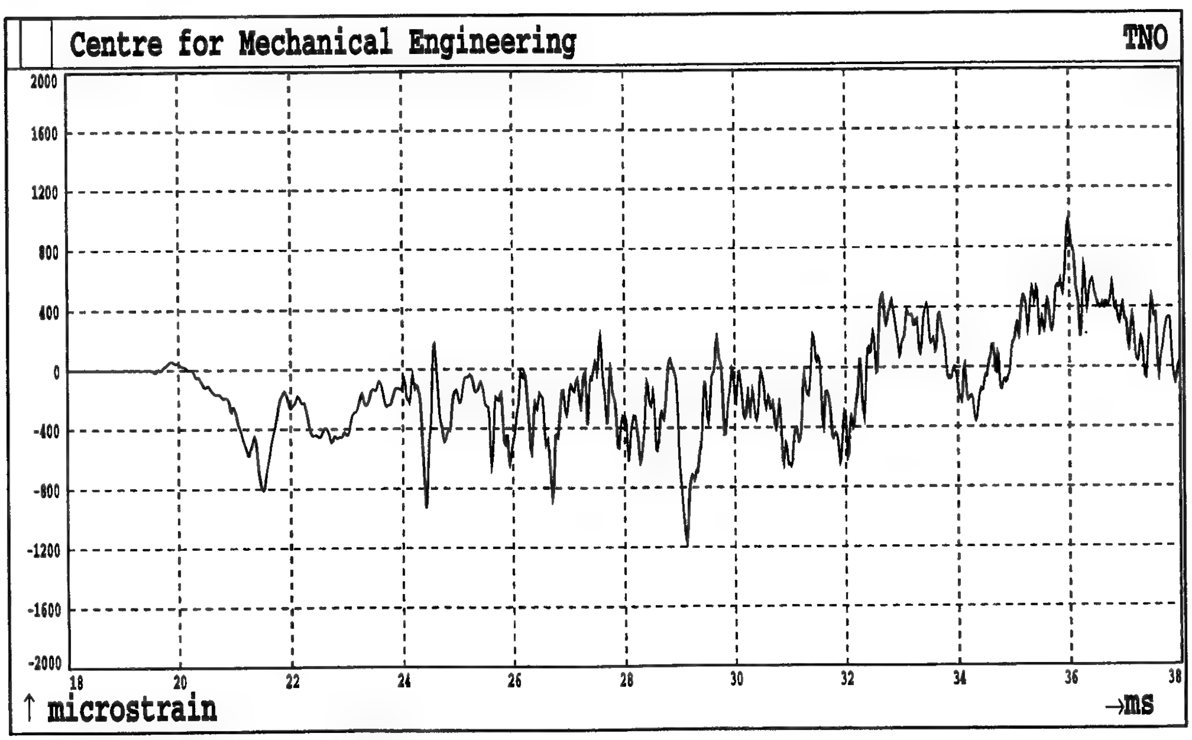


Fig.2A36. Shot 2 Sensor S12

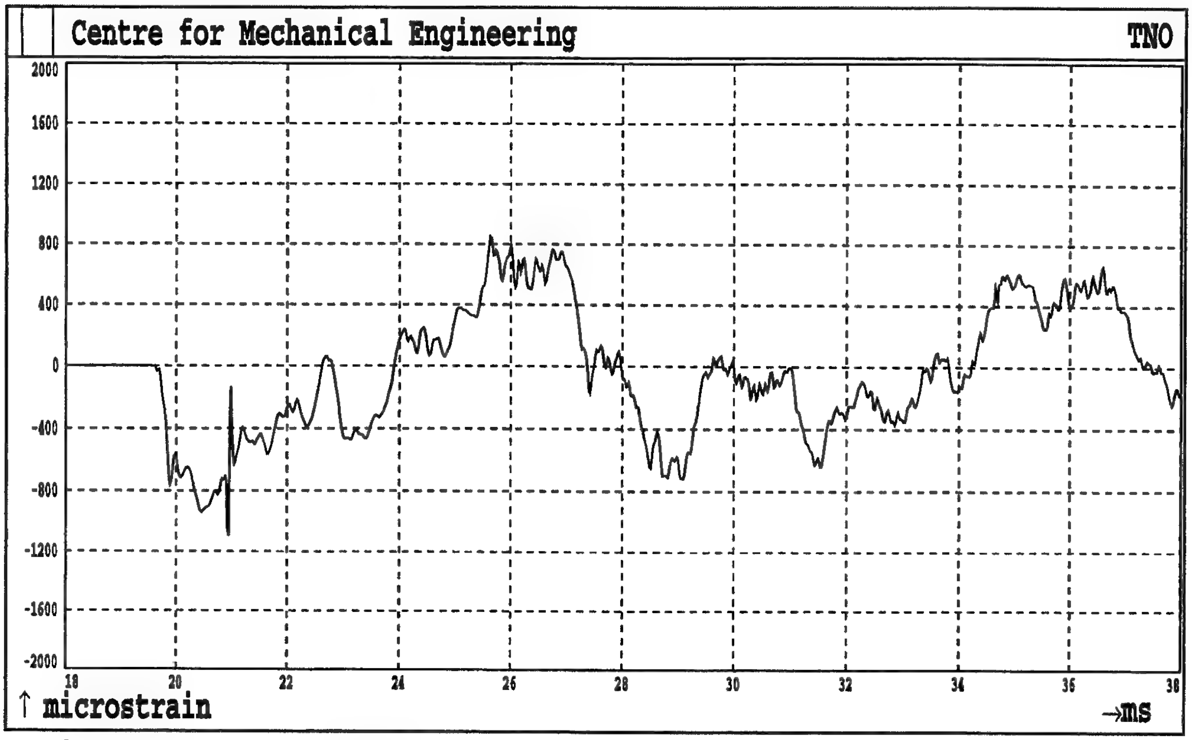


Fig.2A37. Shot 2 Sensor S13

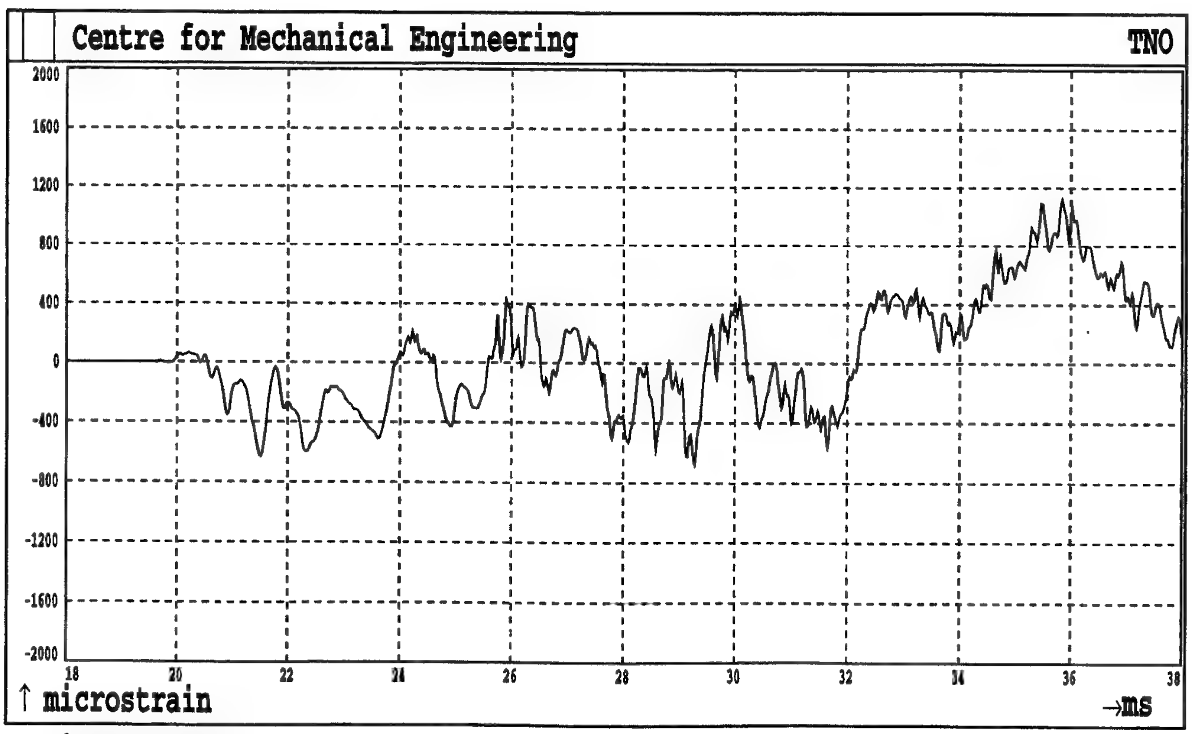


Fig.2A38. Shot 2 Sensor S14

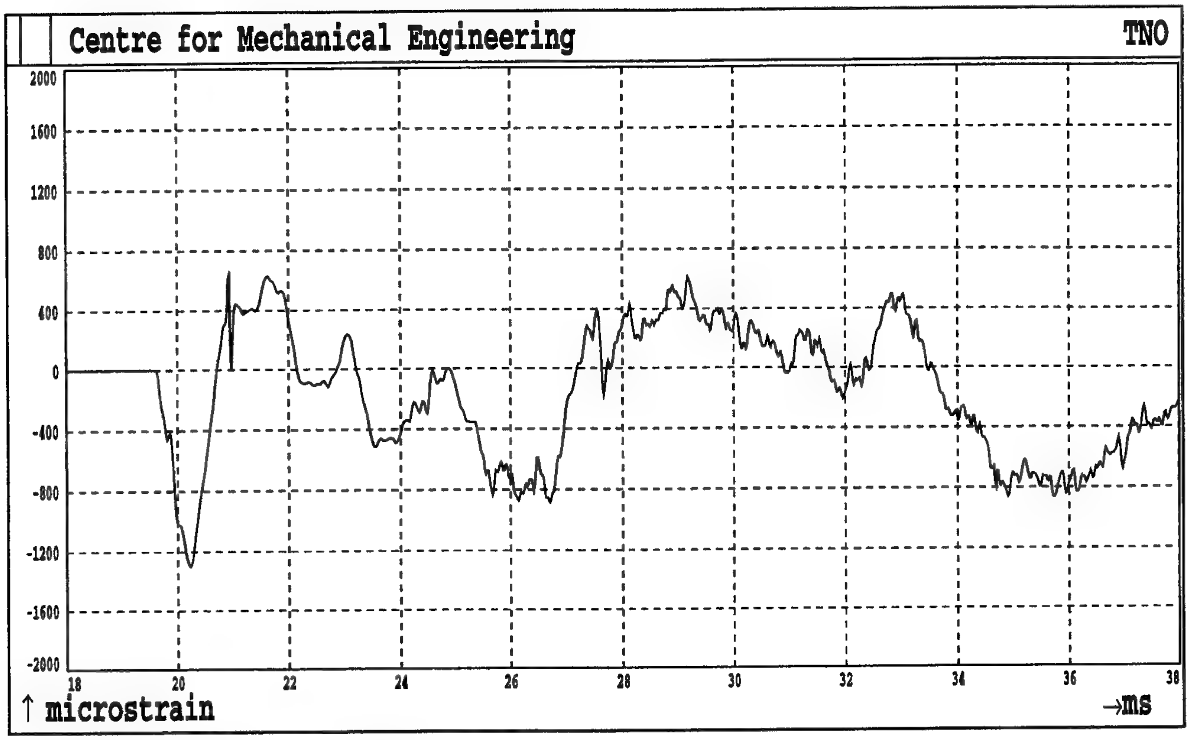


Fig.2A39. Shot 2 Sensor S15

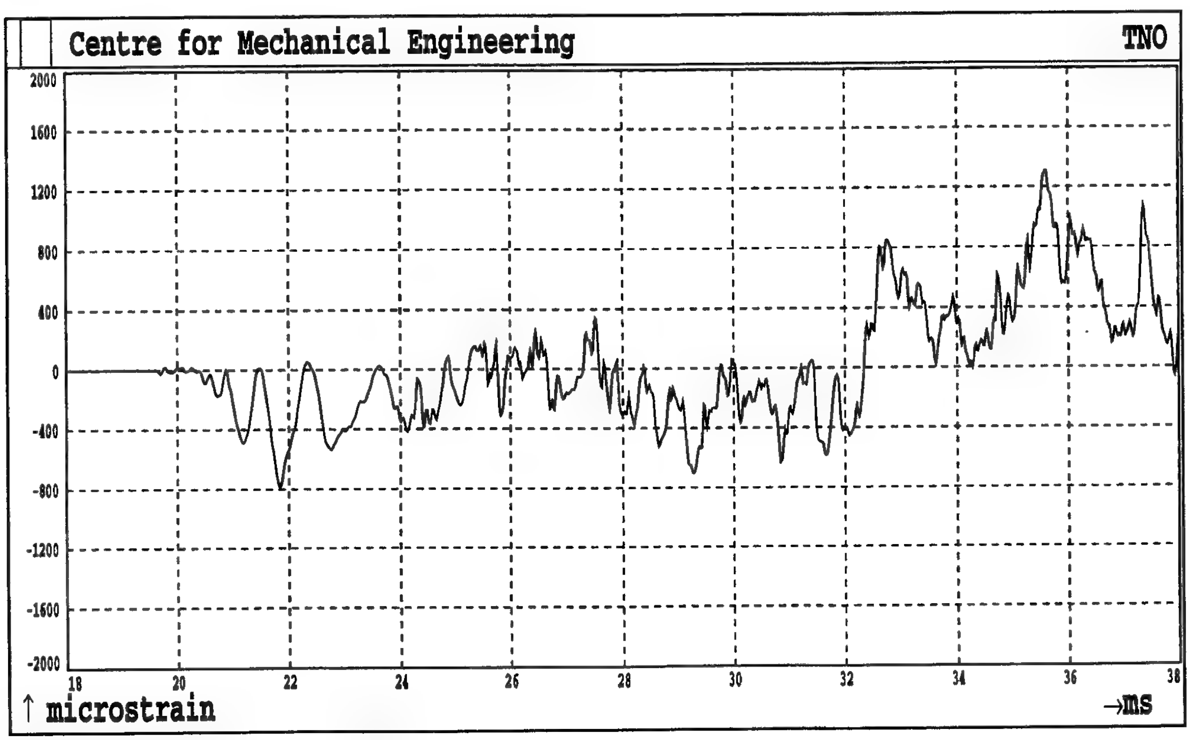


Fig.2A40. Shot 2 Sensor S16

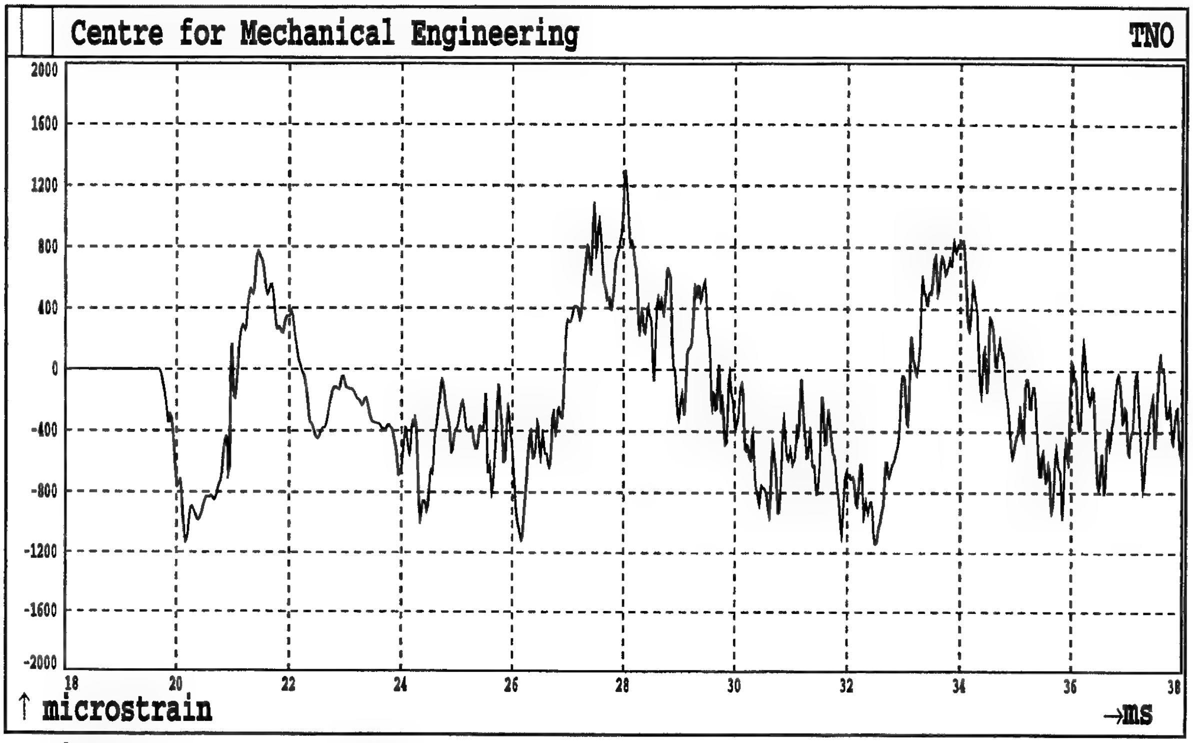


Fig.2A41. Shot 2 Sensor S17

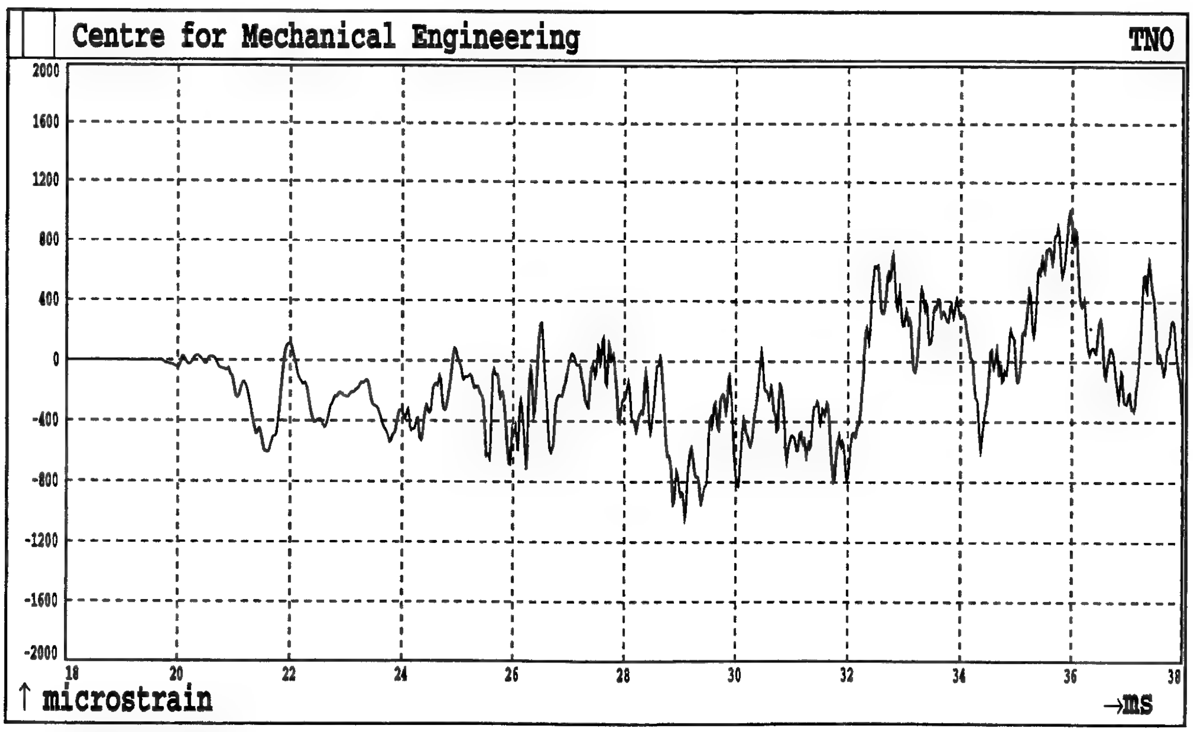


Fig.2A42. Shot 2 Sensor S18

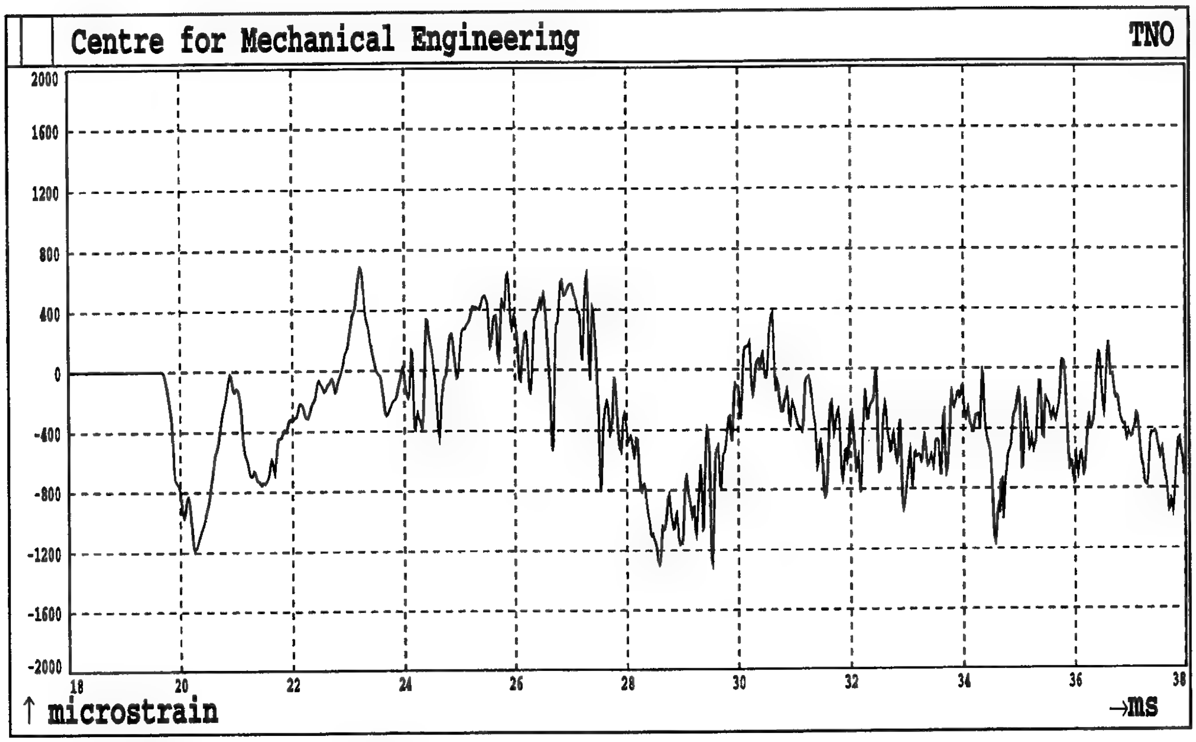


Fig.2A43. Shot 2 Sensor S19

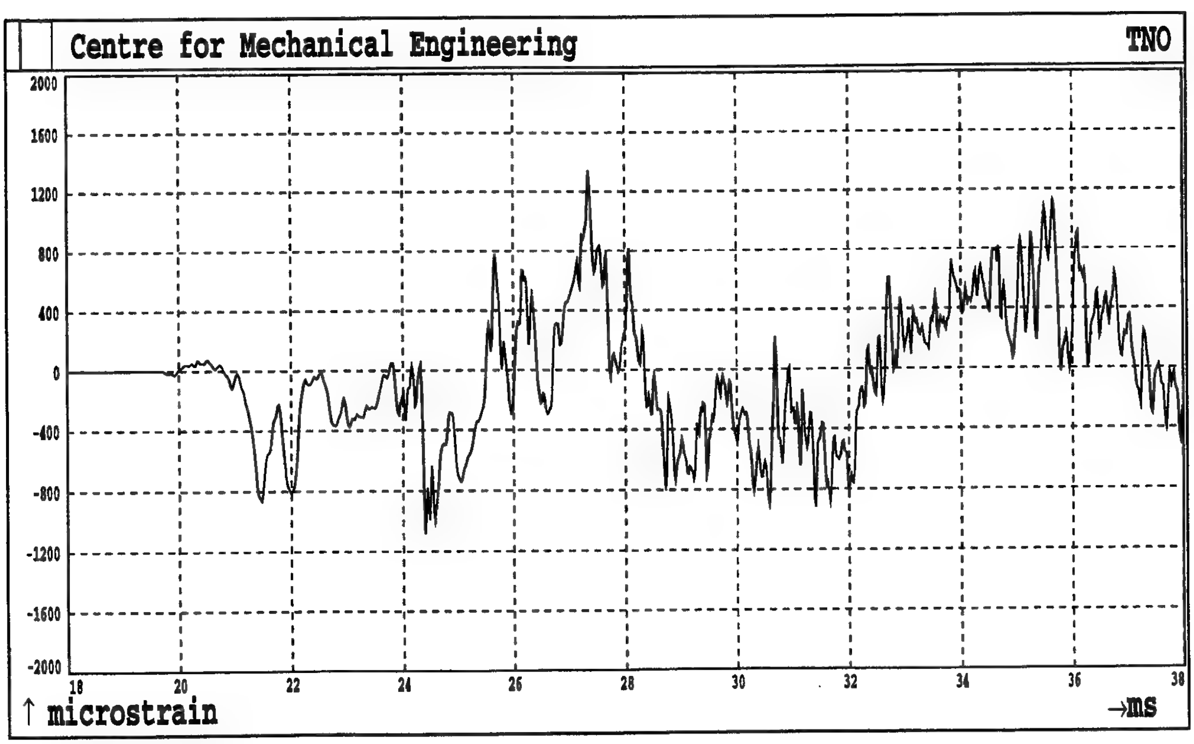


Fig.2A44. Shot 2 Sensor S20

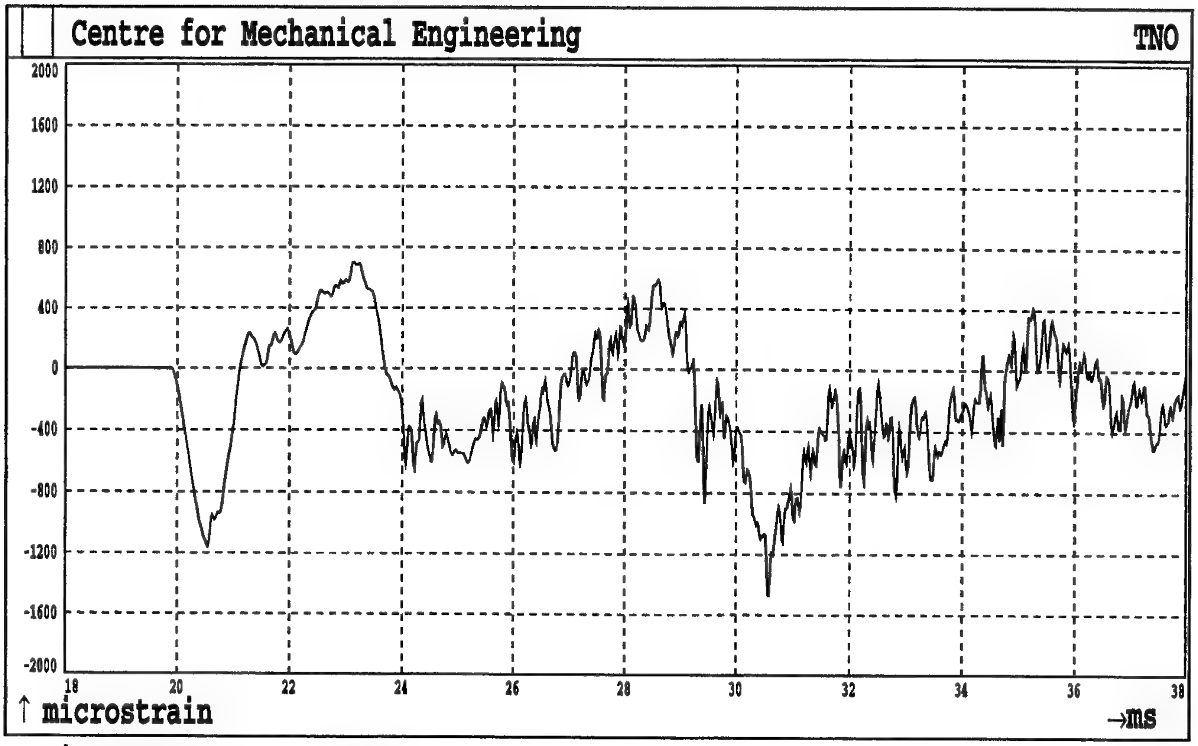


Fig.2A45. Shot 2 Sensor S21

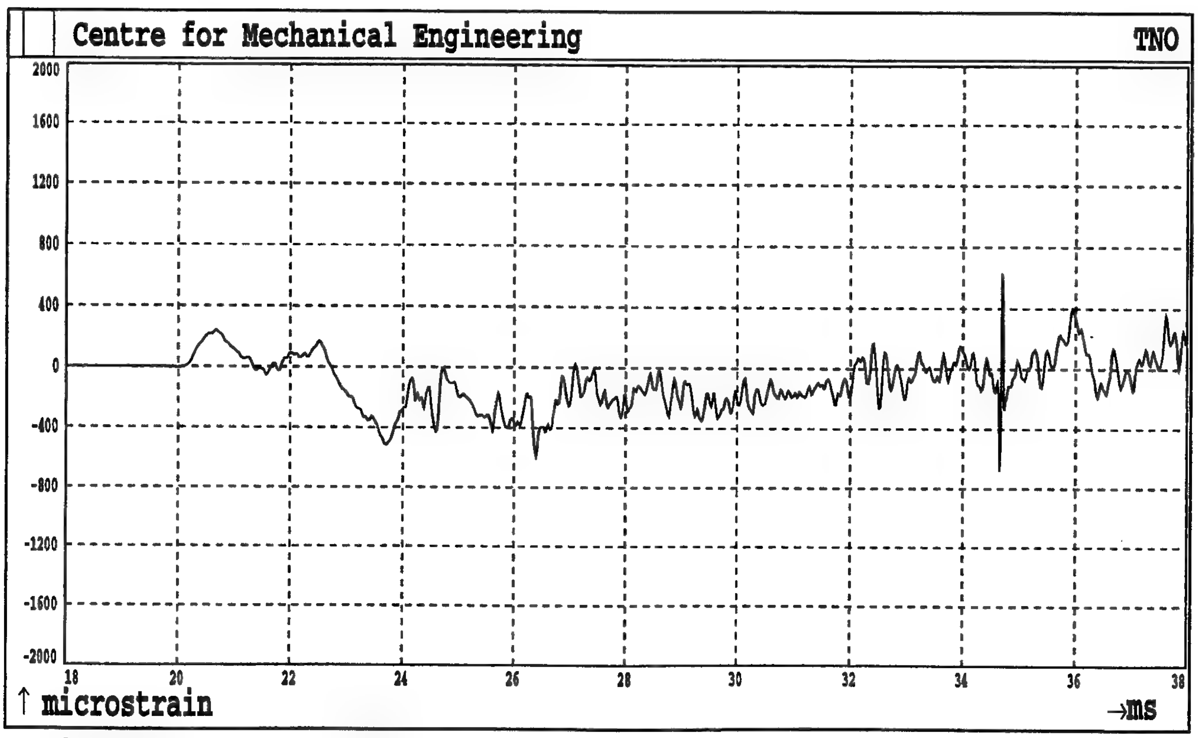


Fig.2A46. Shot 2 Sensor S22

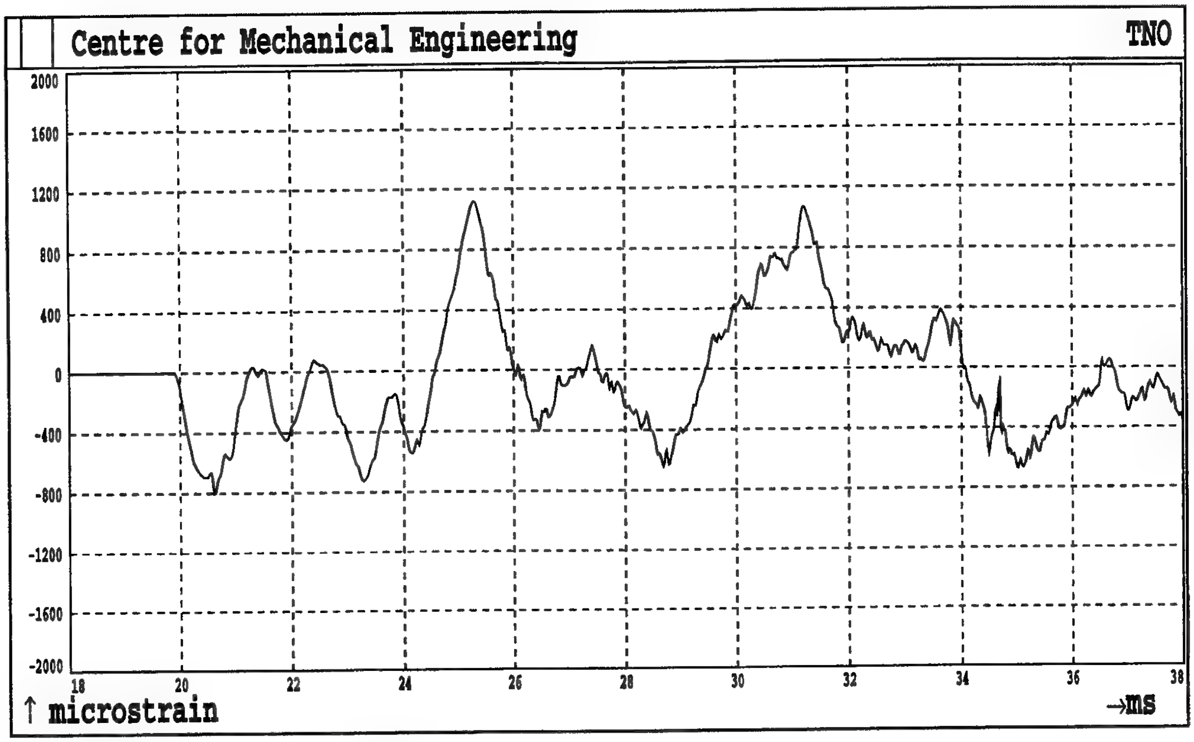


Fig.2A47. Shot 2 Sensor S23

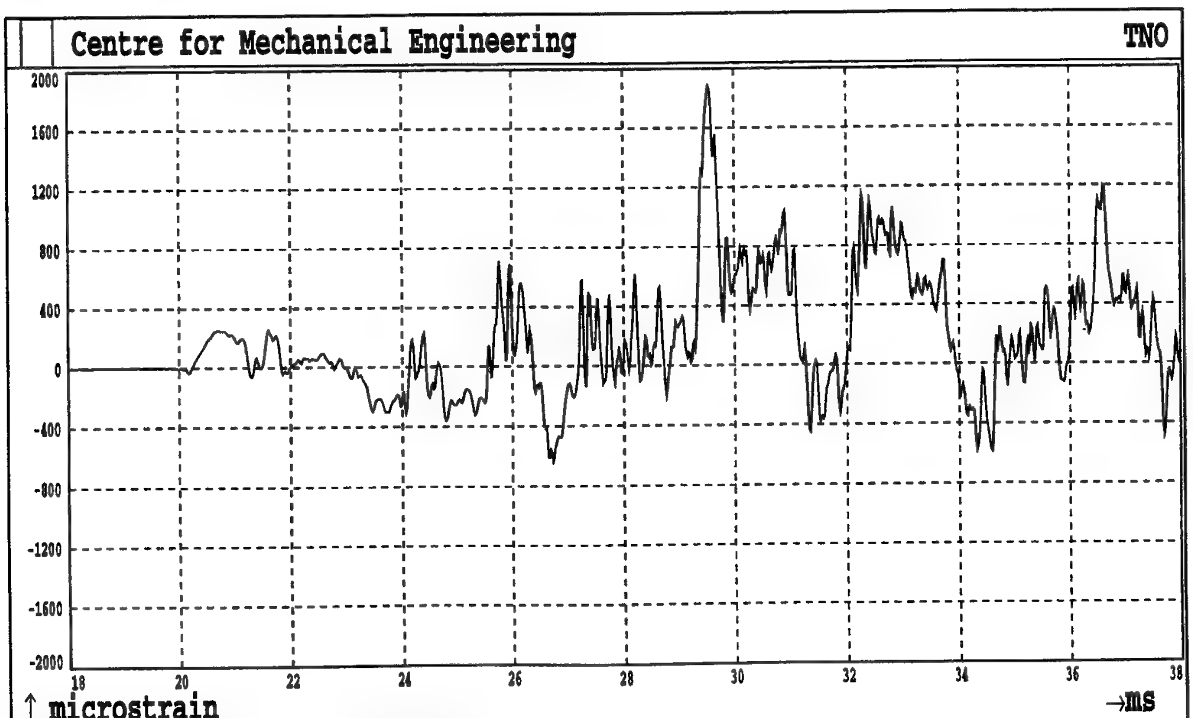


Fig.2A48. Shot 2 Sensor S24

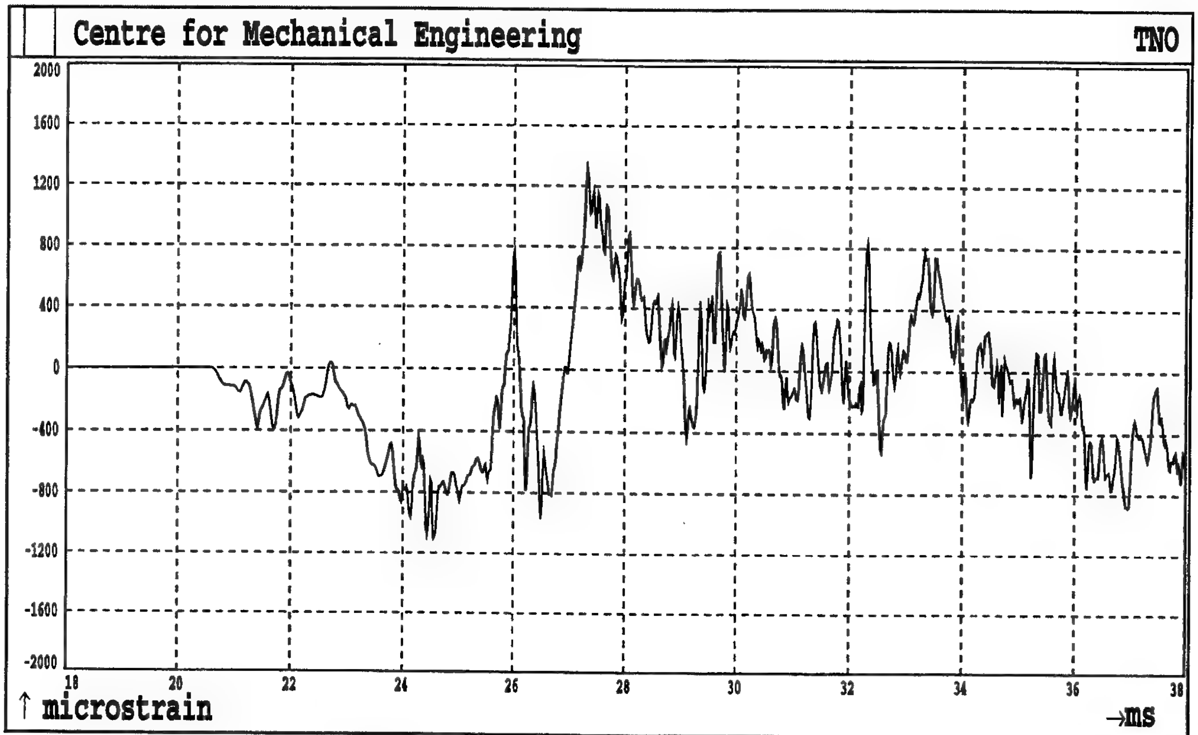


Fig.2A49. Shot 2 Sensor S25

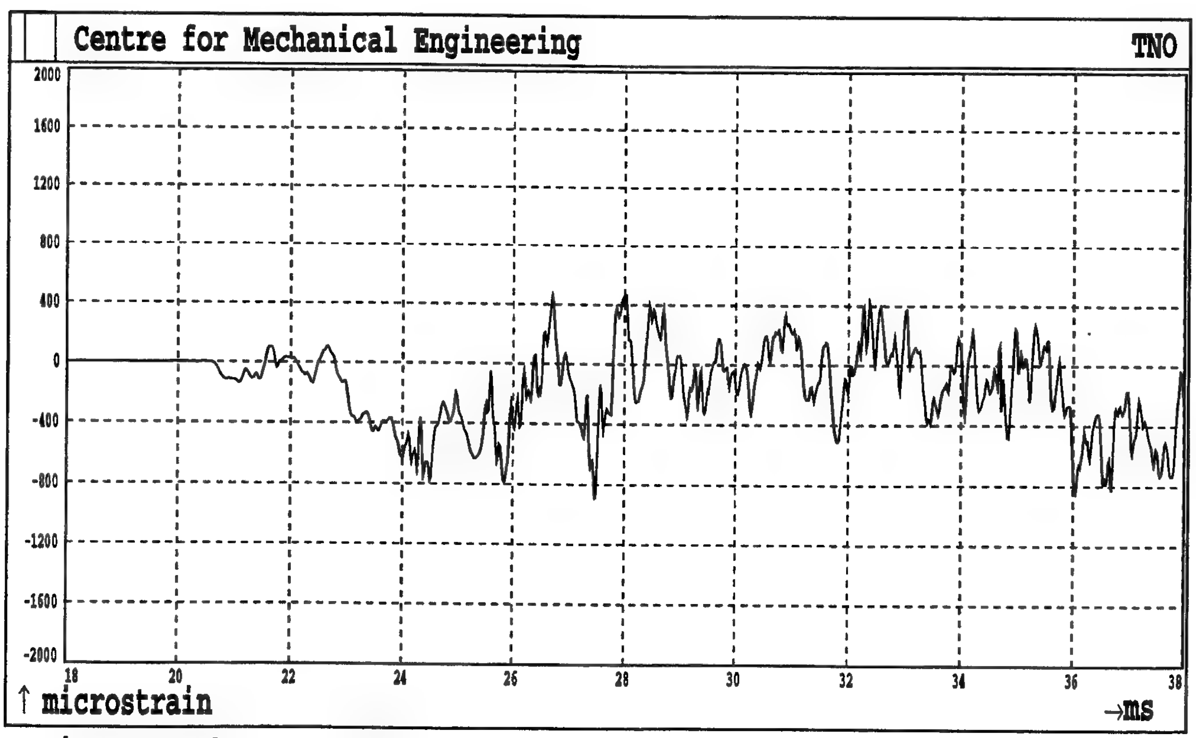


Fig.2A50. Shot 2 Sensor S26

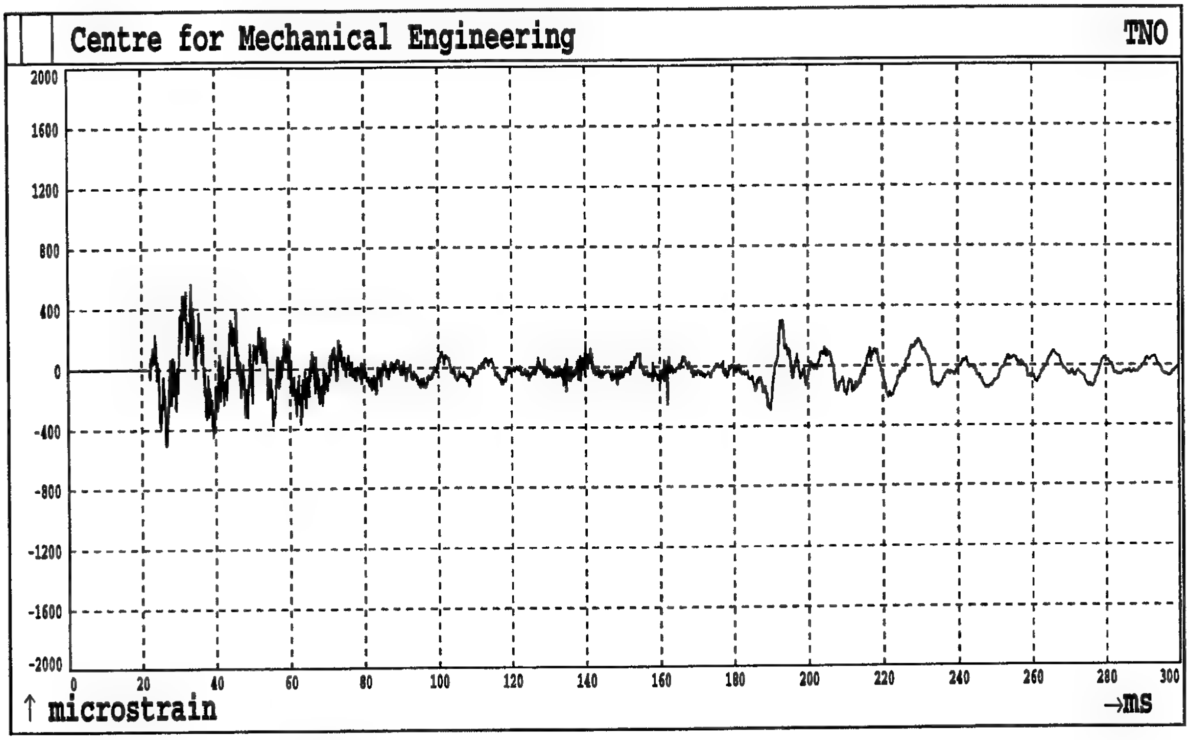


Fig.3A1. Shot 3 Sensor S1

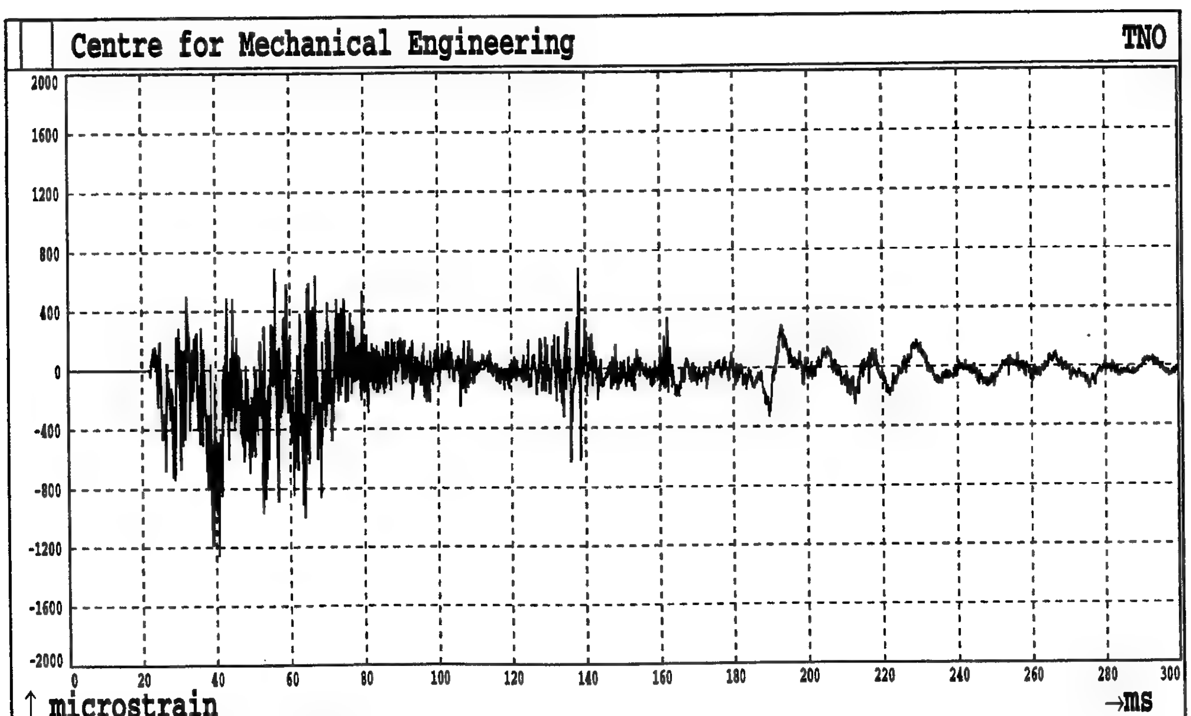


Fig.3A2. Shot 3 Sensor S2

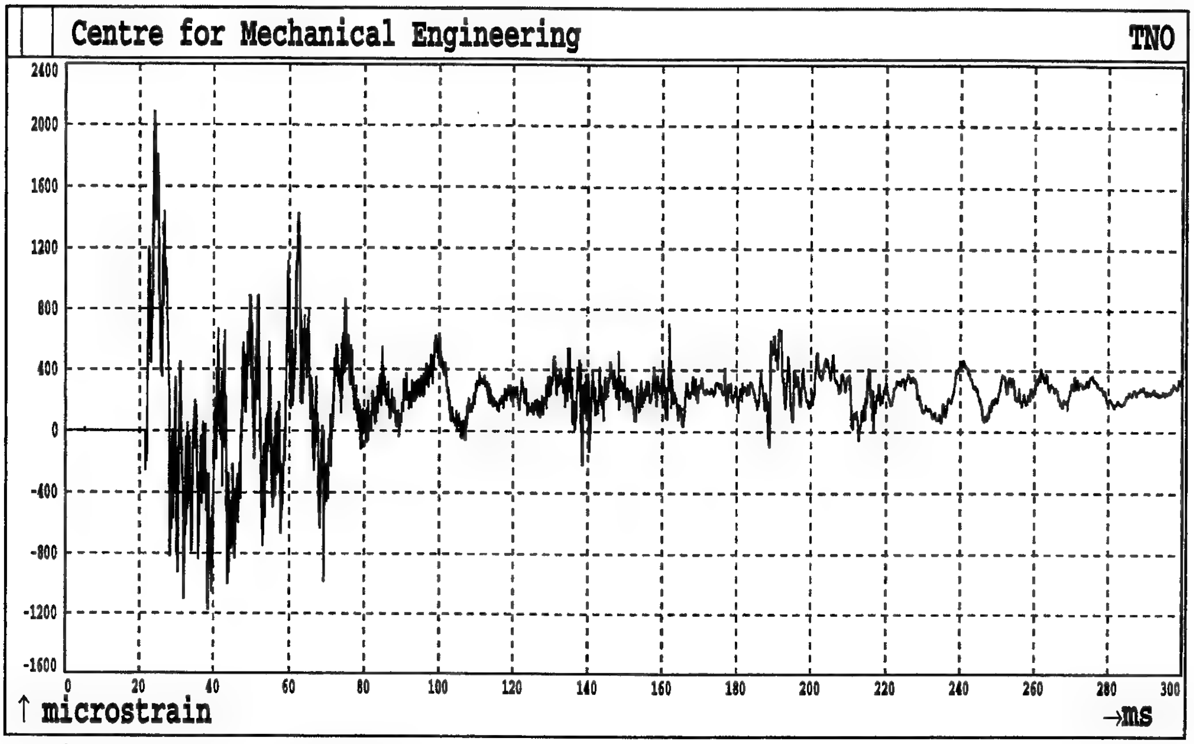


Fig.3A3. Shot 3 Sensor S3

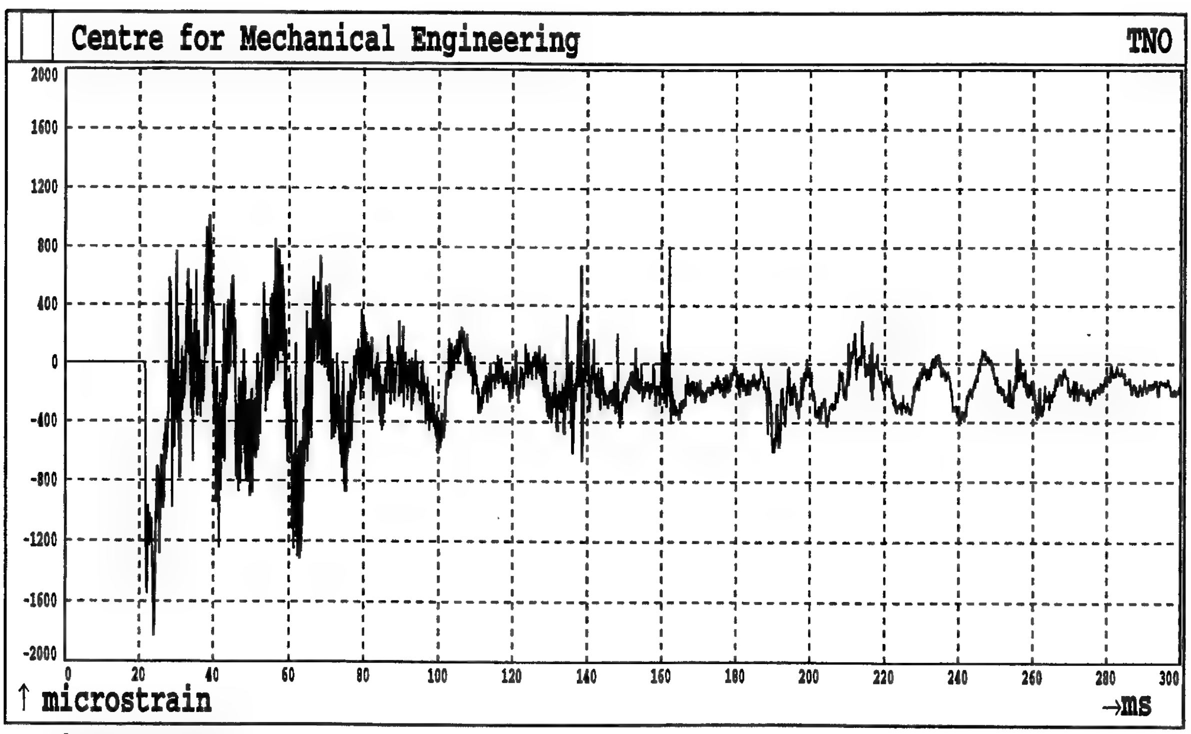


Fig.3A4. Shot 3 Sensor S4

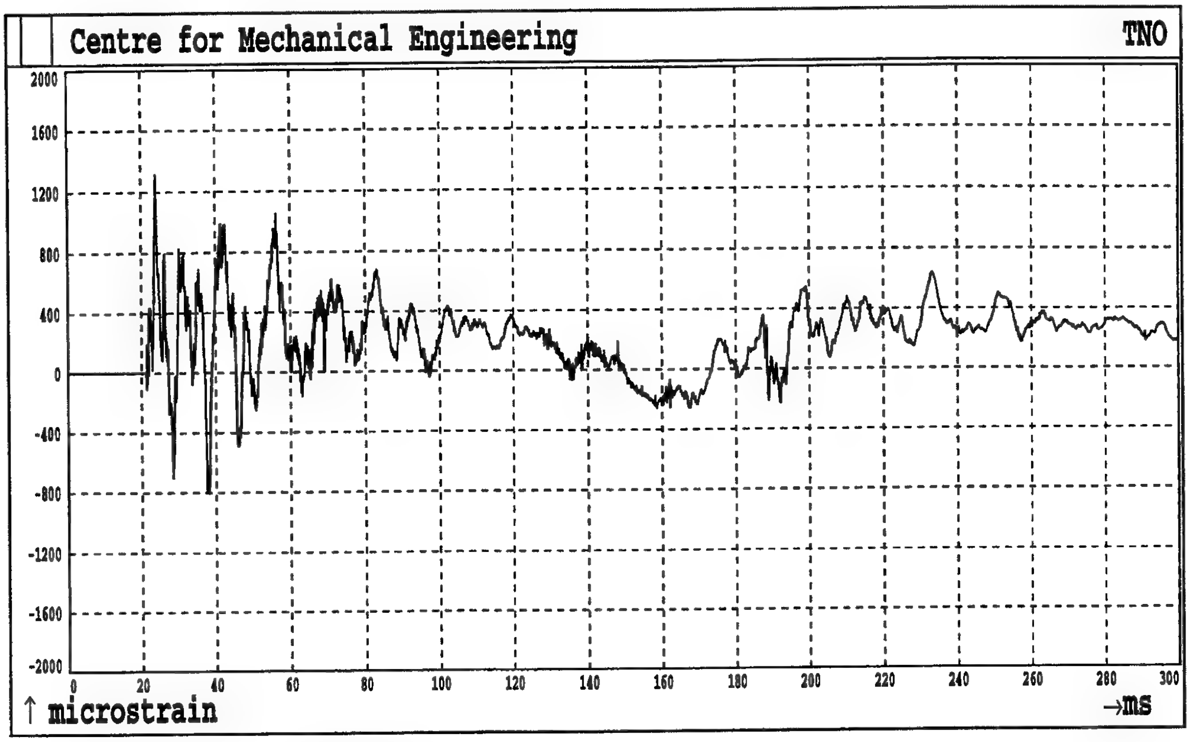


Fig.3A5. Shot 3 Sensor S5

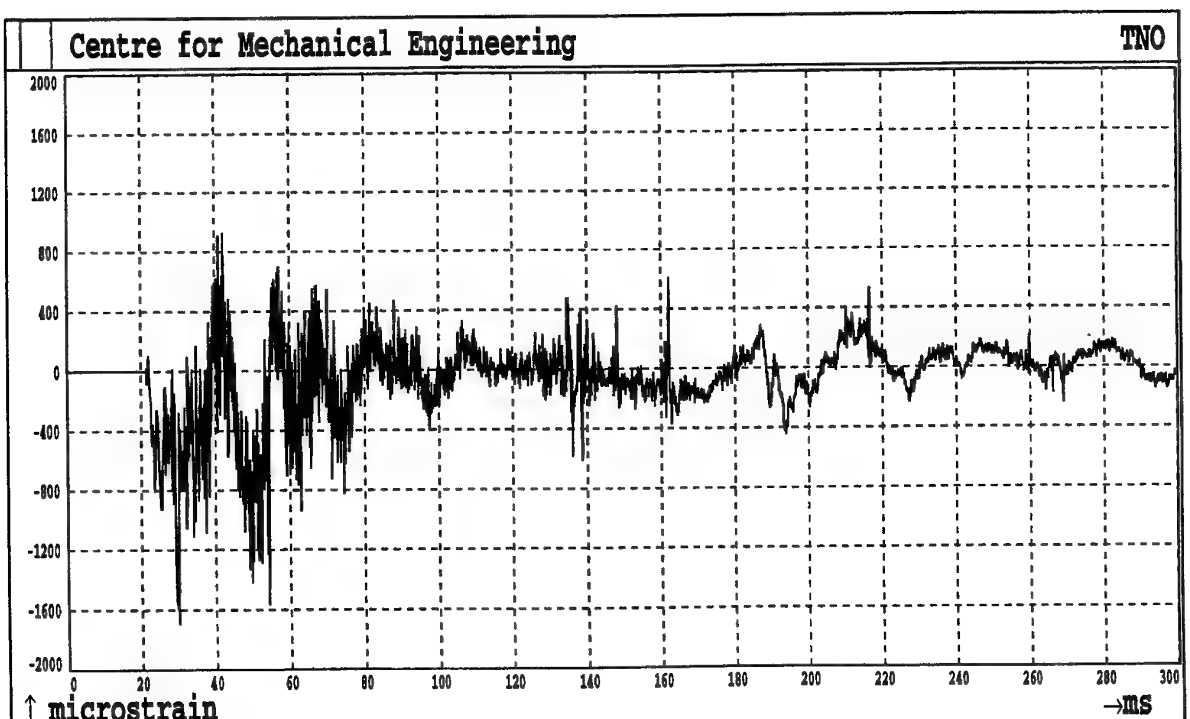


Fig.3A6. Shot 3 Sensor S6

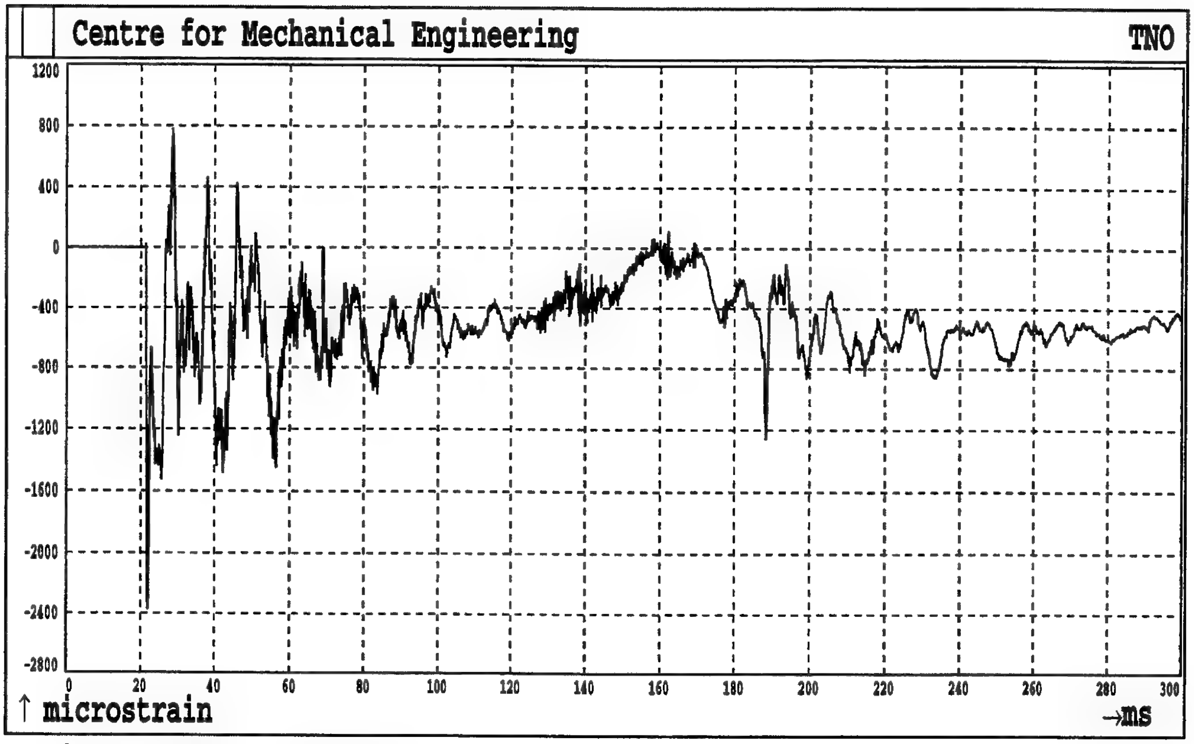


Fig.3A7. Shot 3 Sensor S7

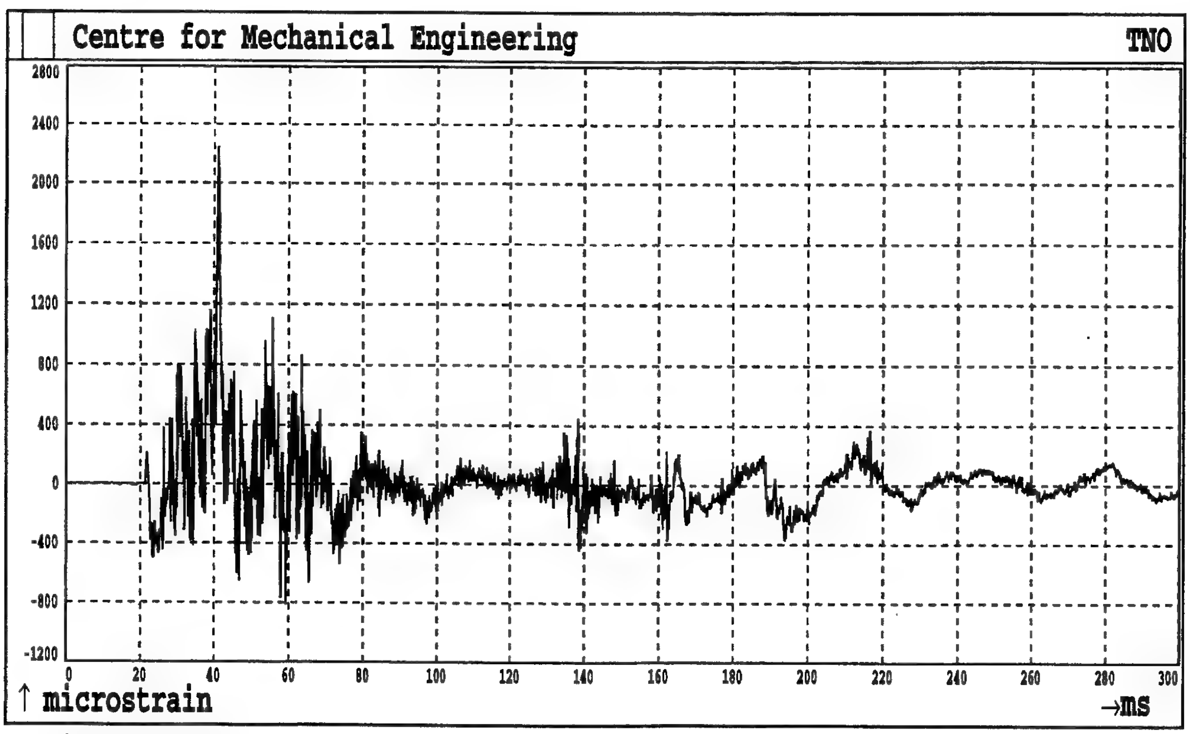


Fig.3A8. Shot 3 Sensor S8

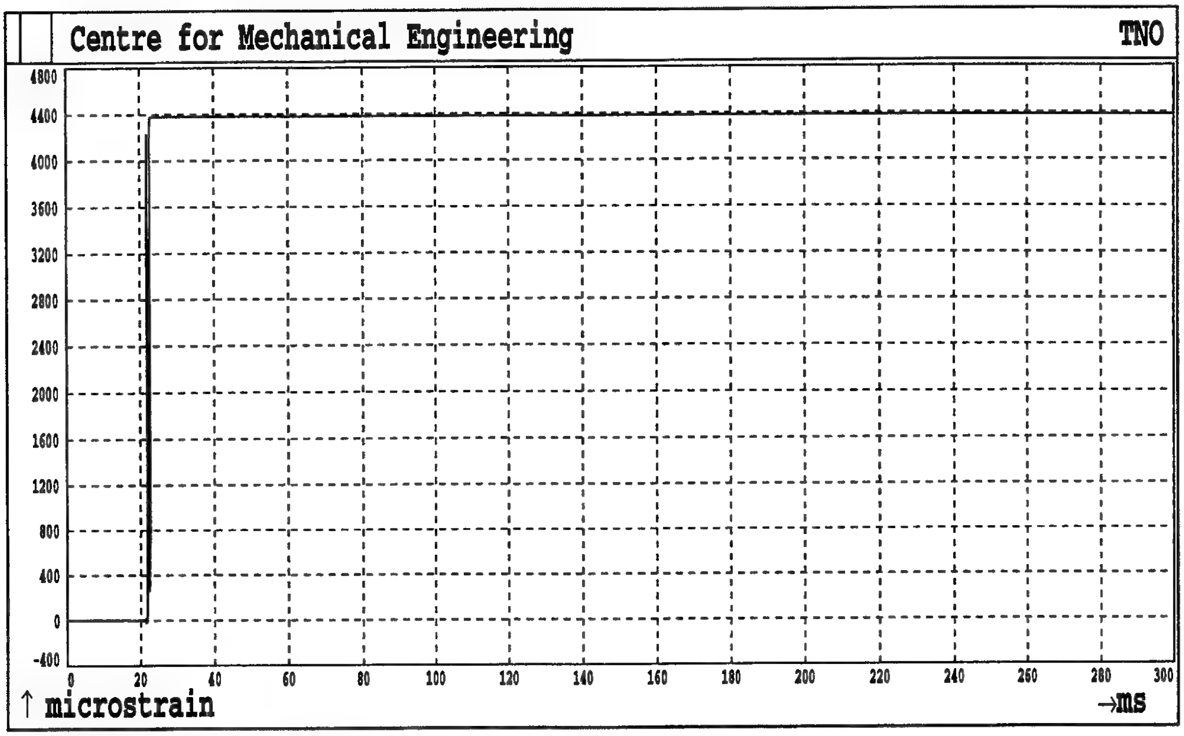


Fig.3A9. Shot 3 Sensor S10

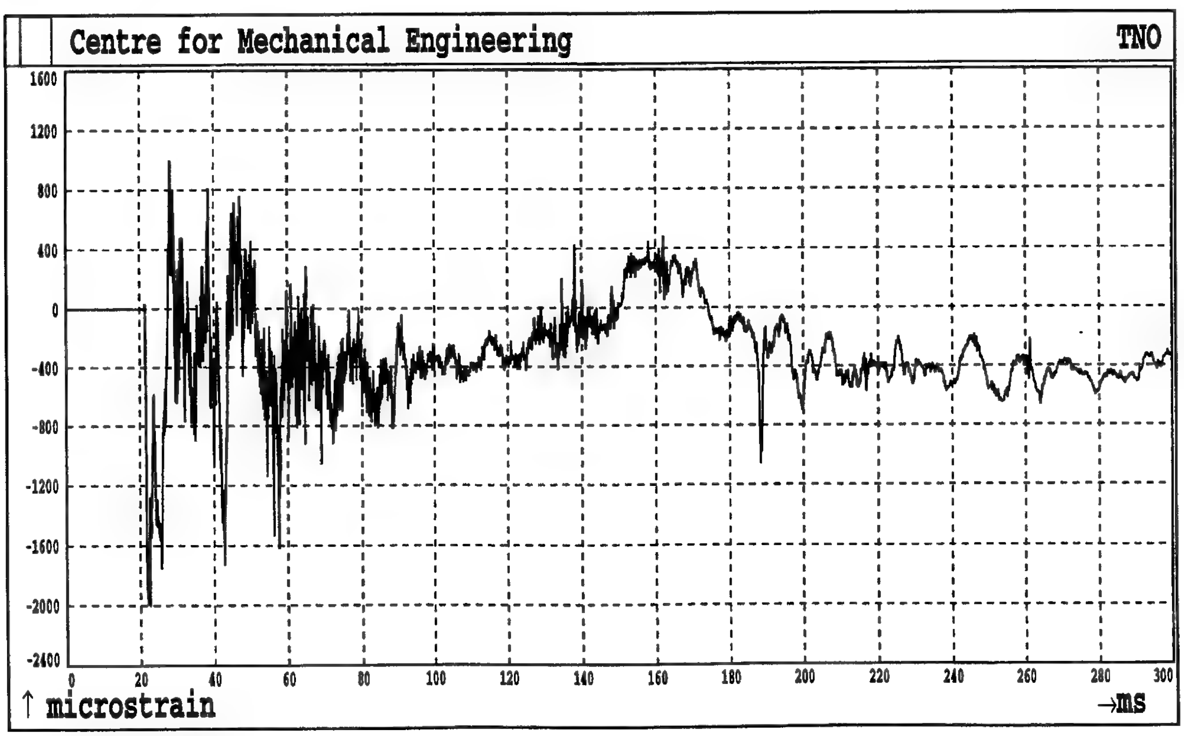


Fig.3A10. Shot 3 Sensor S11

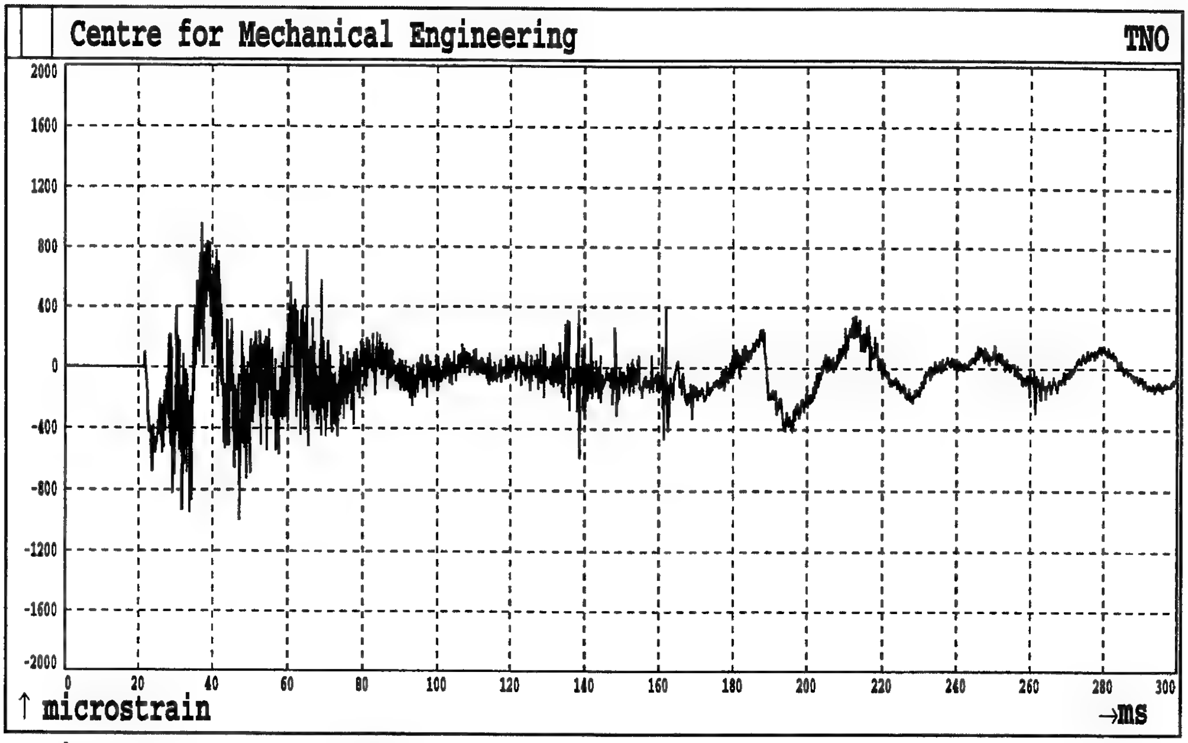


Fig.3A11. Shot 3 Sensor S12

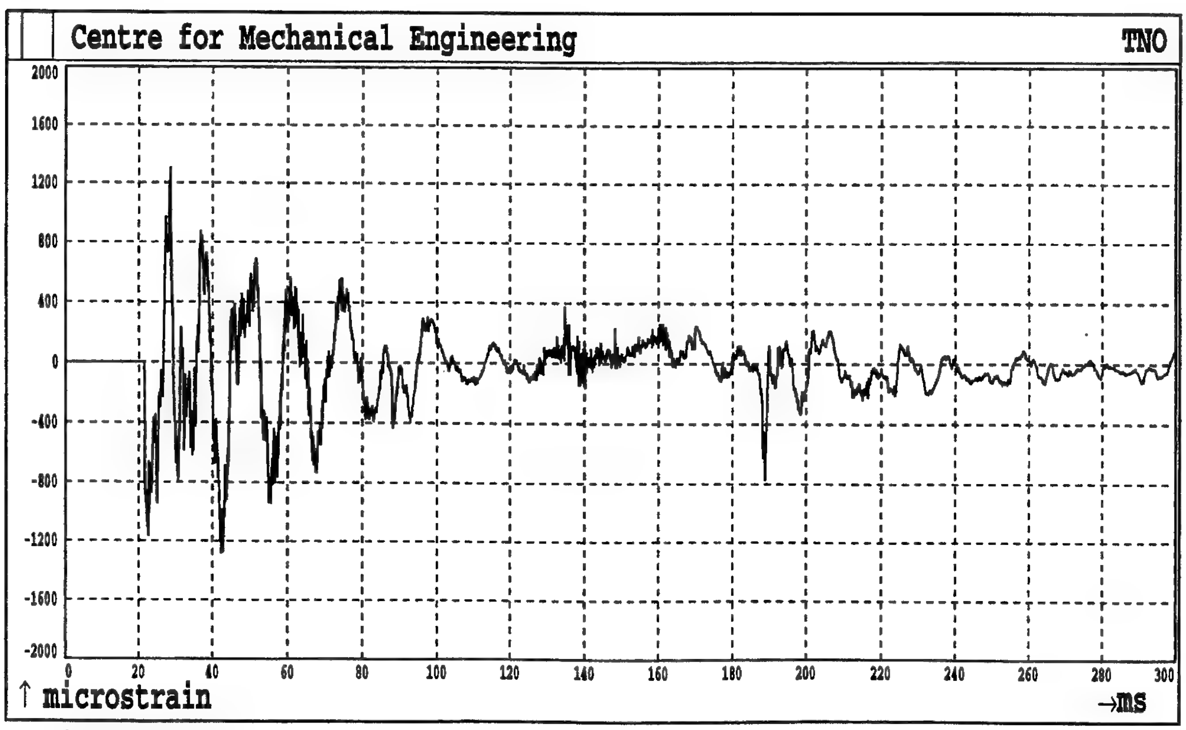


Fig.3A12. Shot 3 Sensor S13

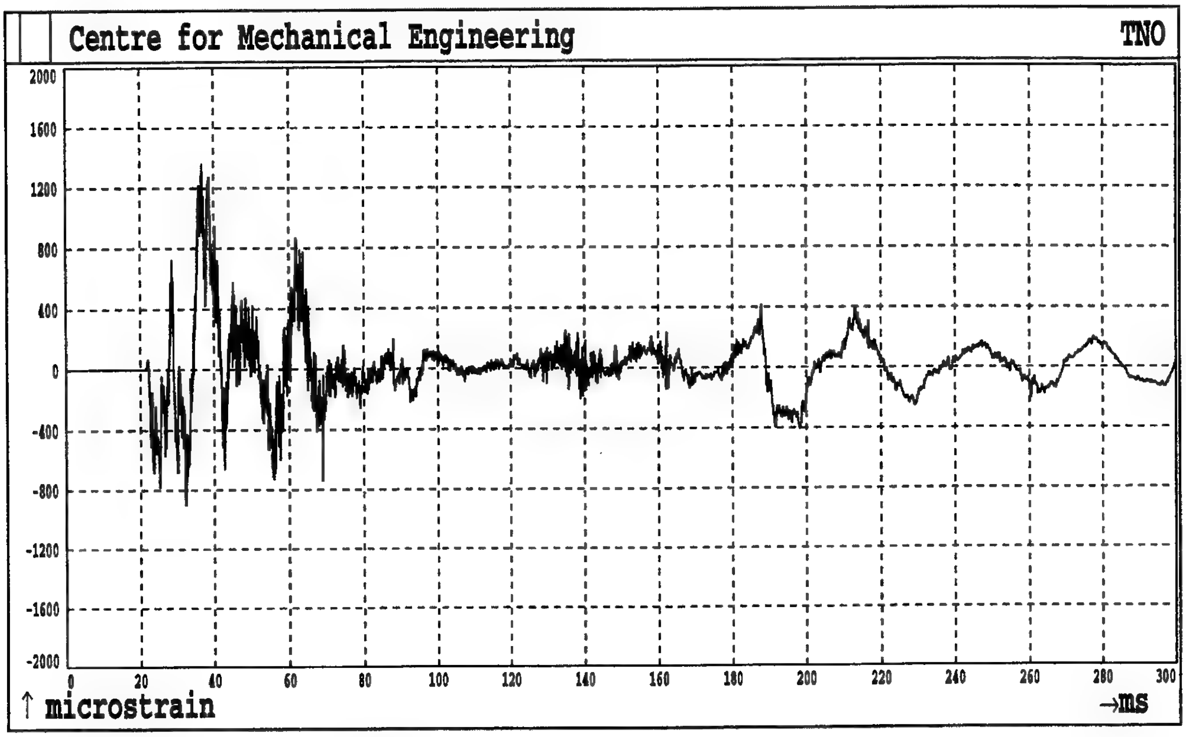


Fig.3A13. Shot 3 Sensor S14

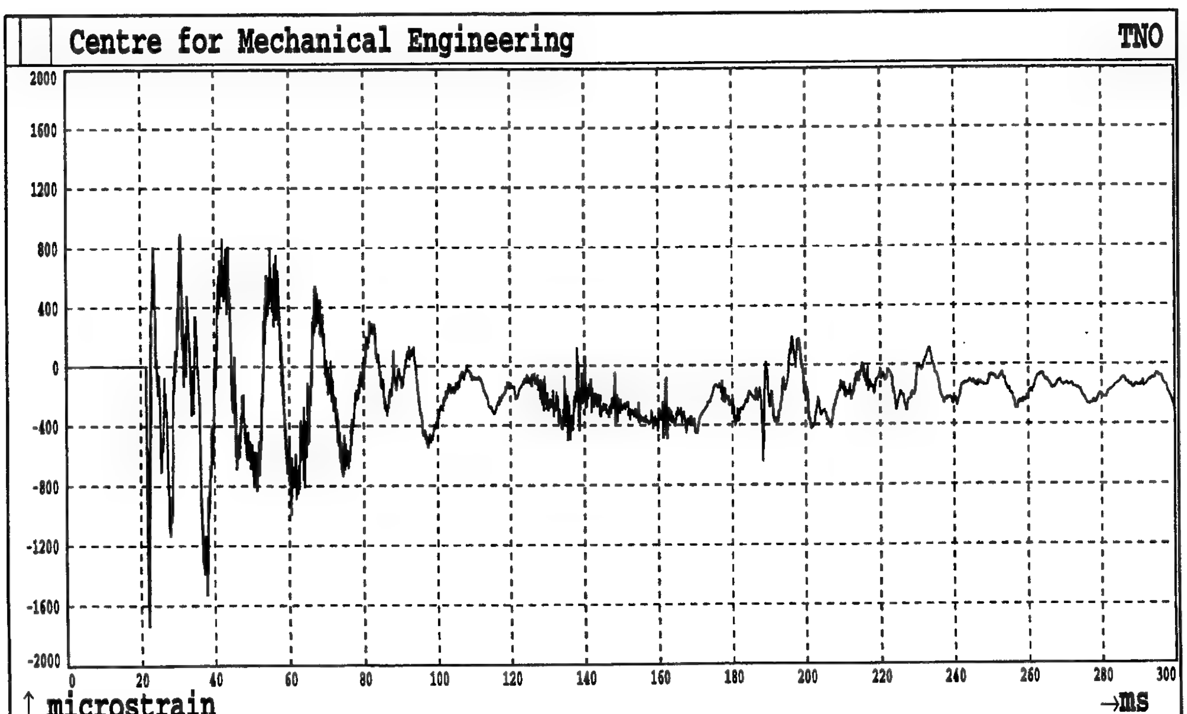


Fig.3A14. Shot 3 Sensor S15

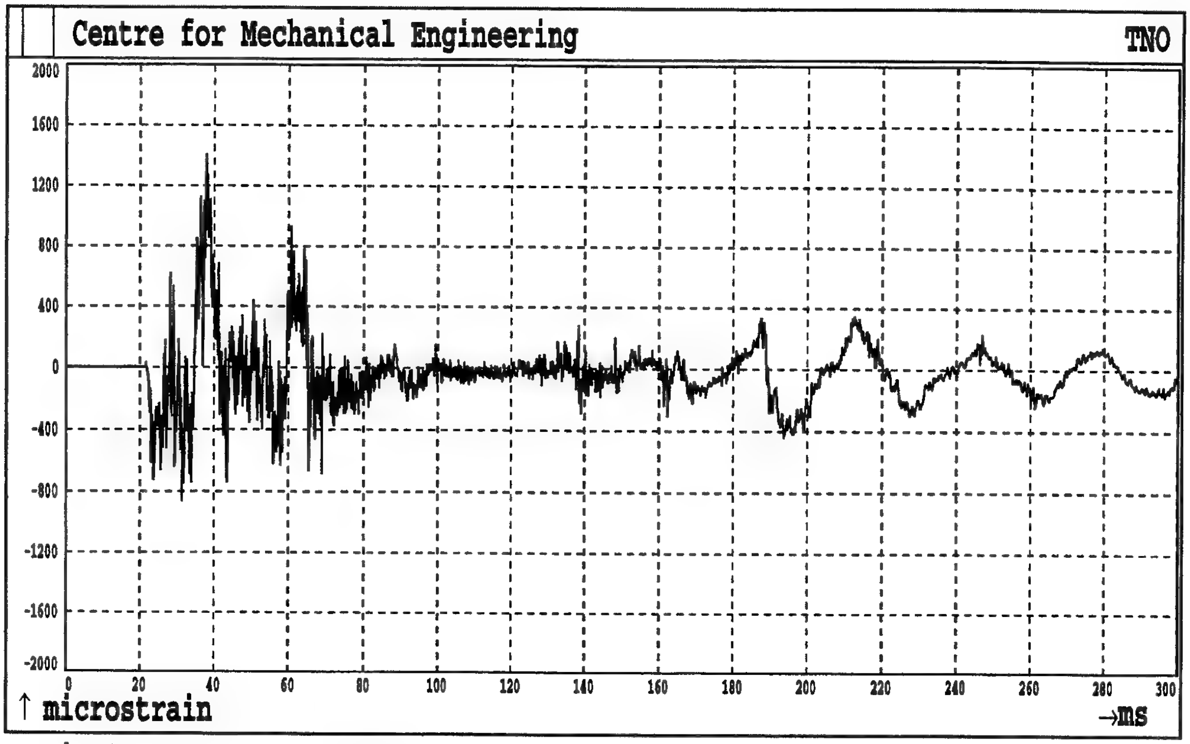


Fig.3A15. Shot 3 Sensor S16

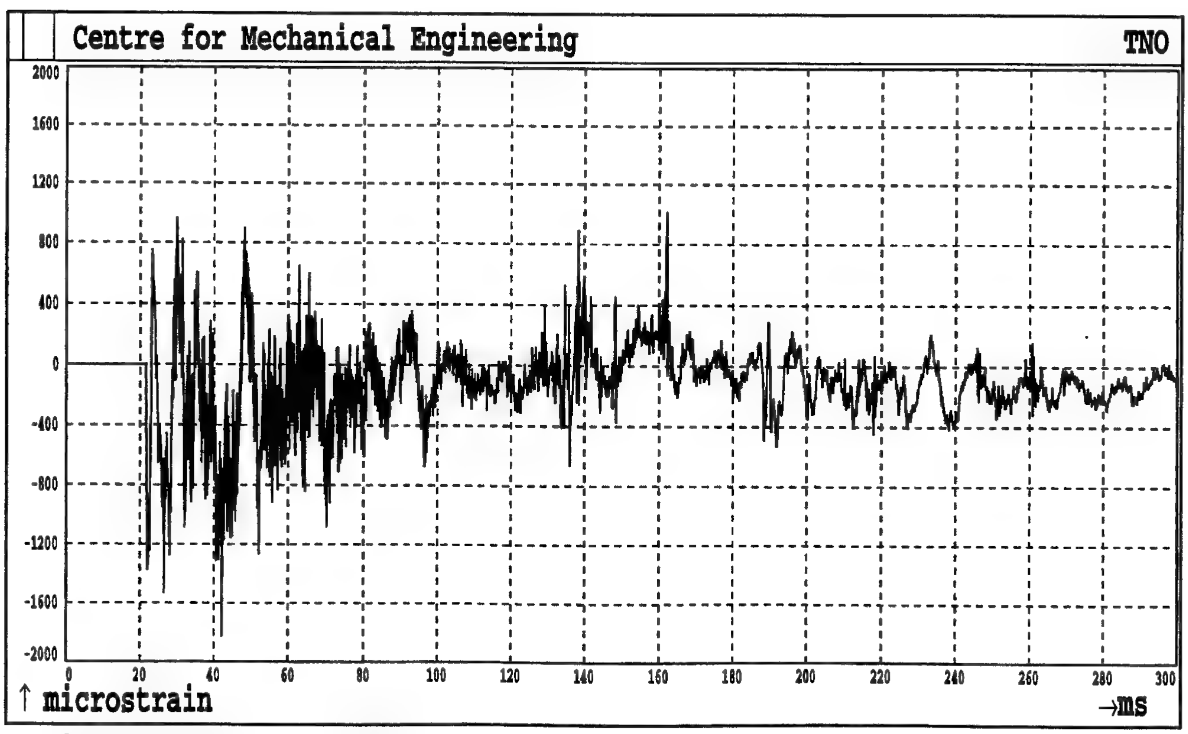


Fig.3A16. Shot 3 Sensor S17

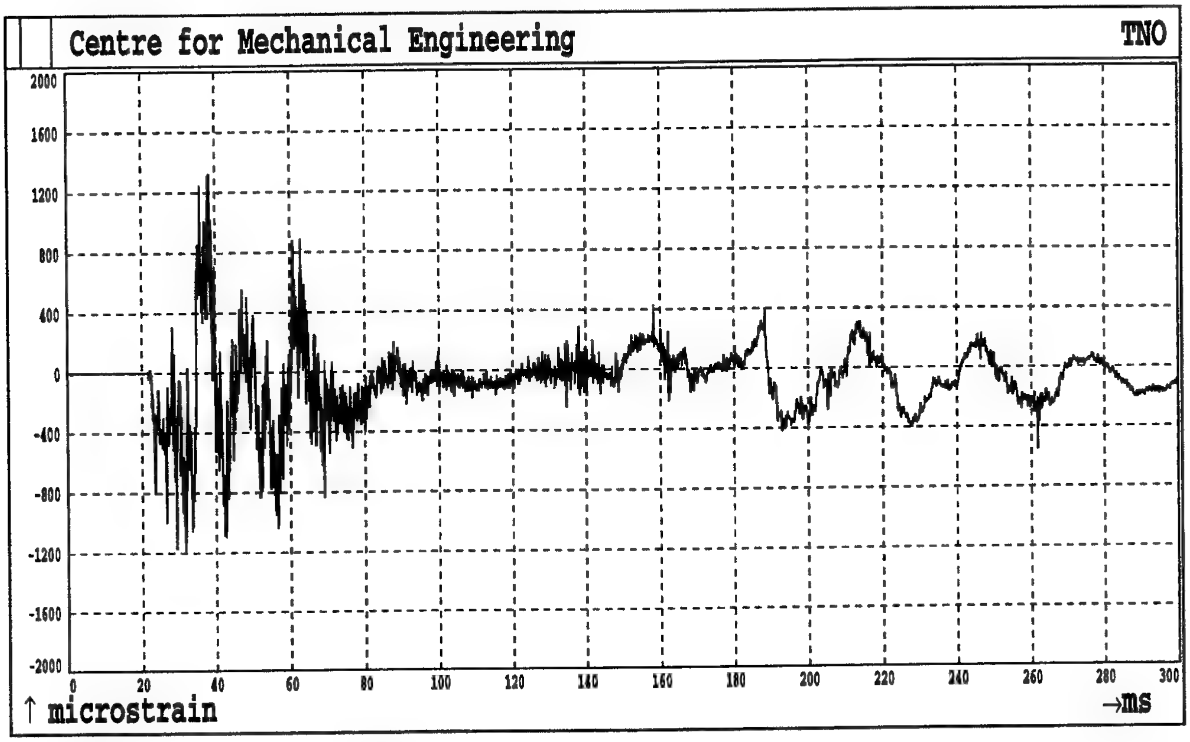


Fig.3A17. Shot 3 Sensor S18

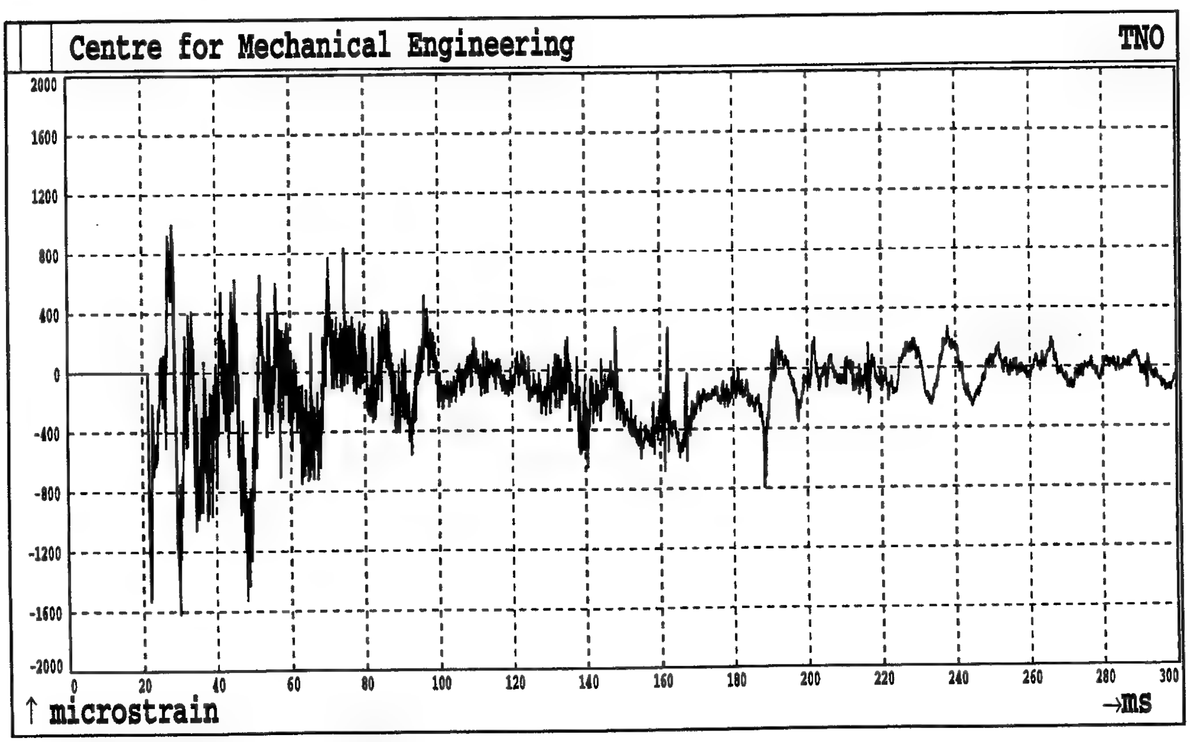


Fig.3A18. Shot 3 Sensor S19

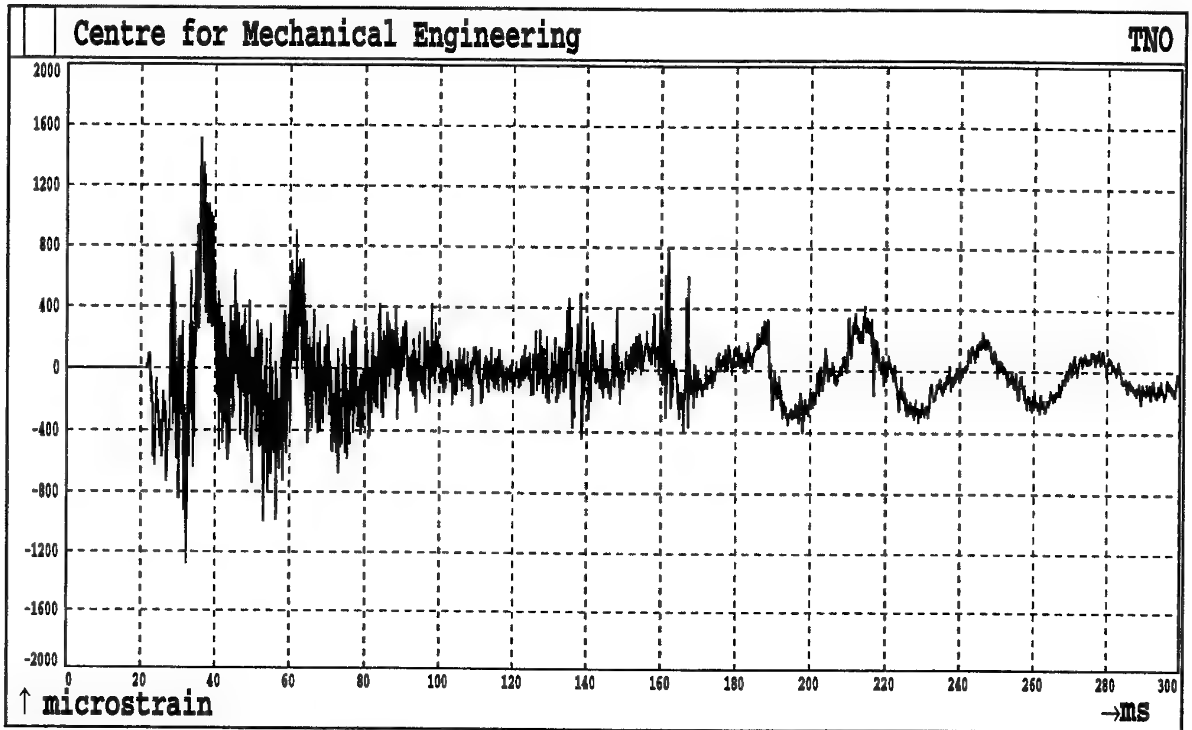


Fig.3A19. Shot 3 Sensor S20

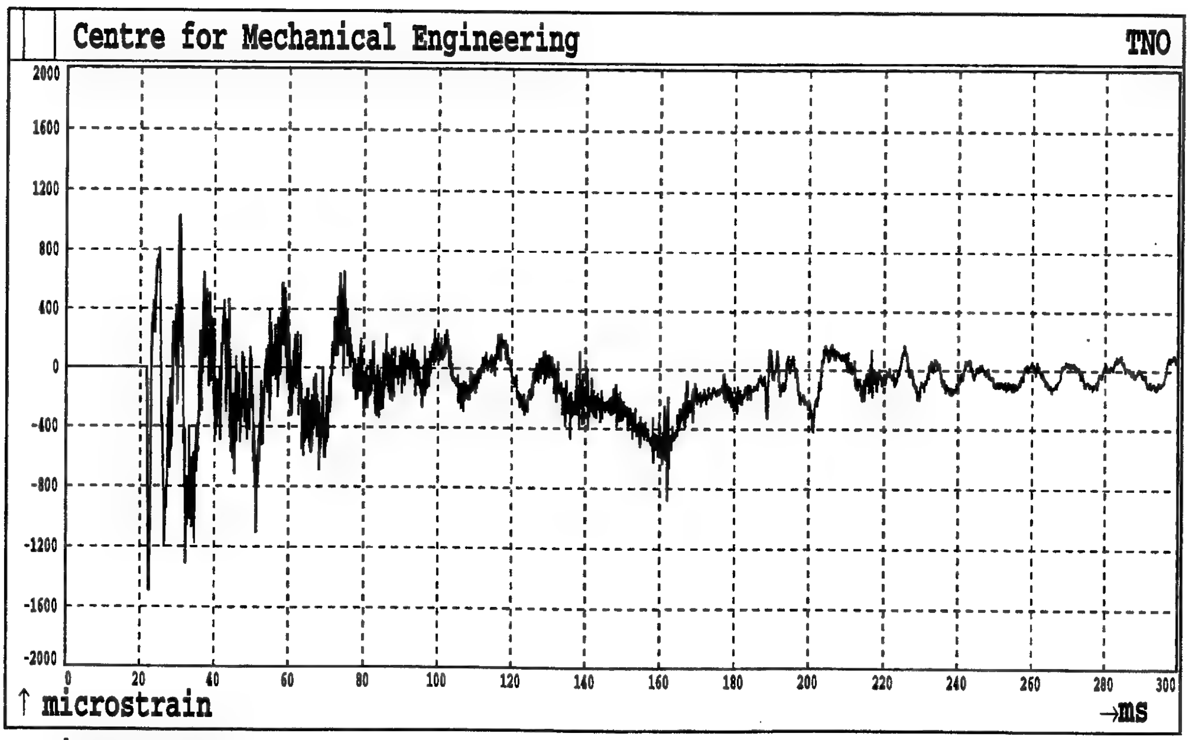


Fig.3A20. Shot 3 Sensor S21

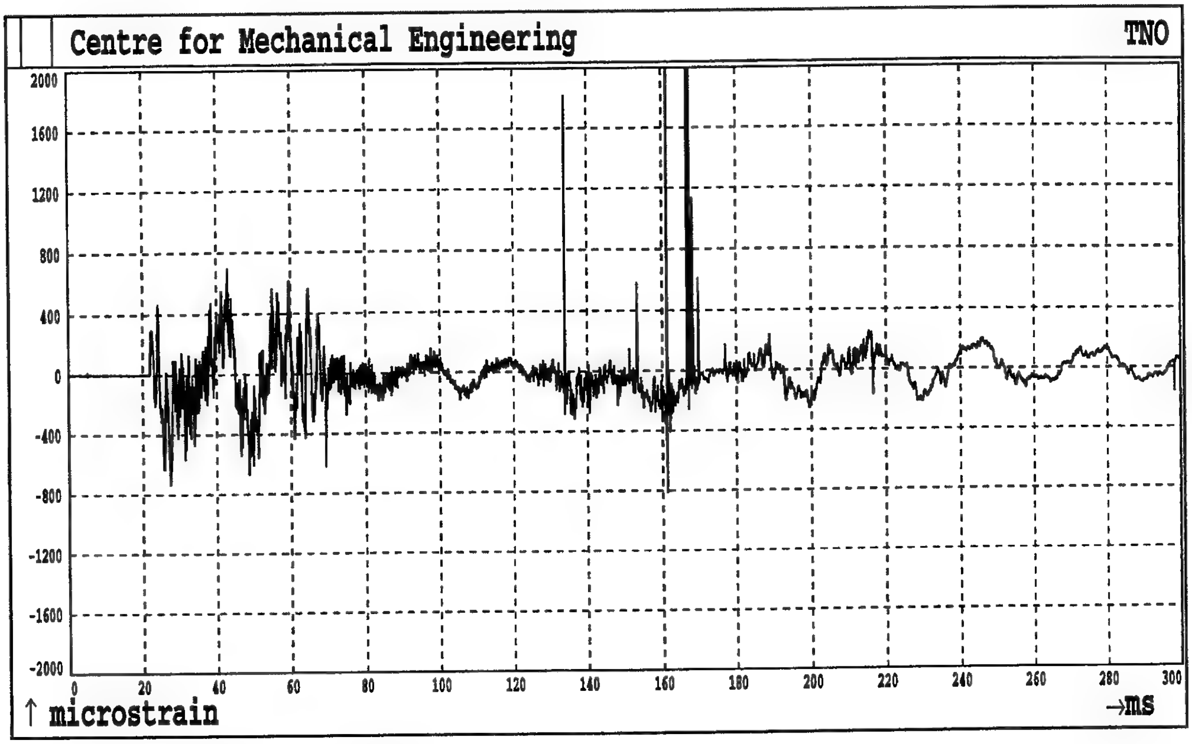


Fig.3A21. Shot 3 Sensor S22

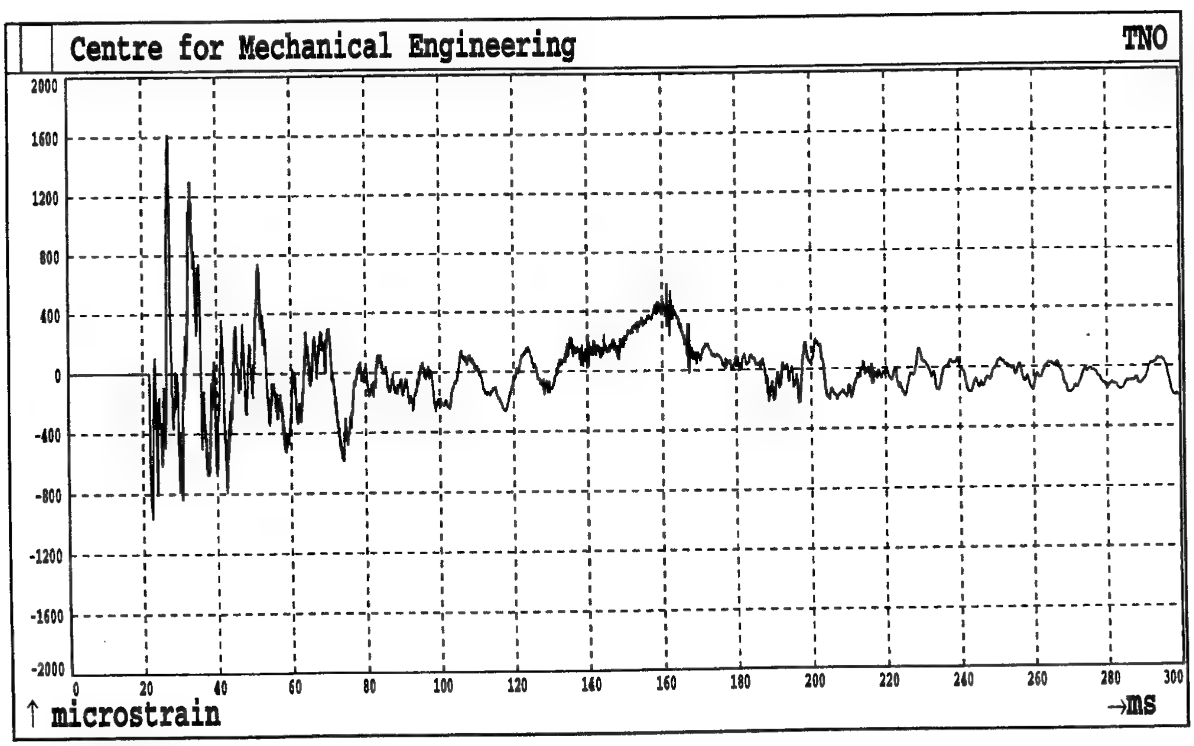


Fig.3A22. Shot 3 Sensor S23

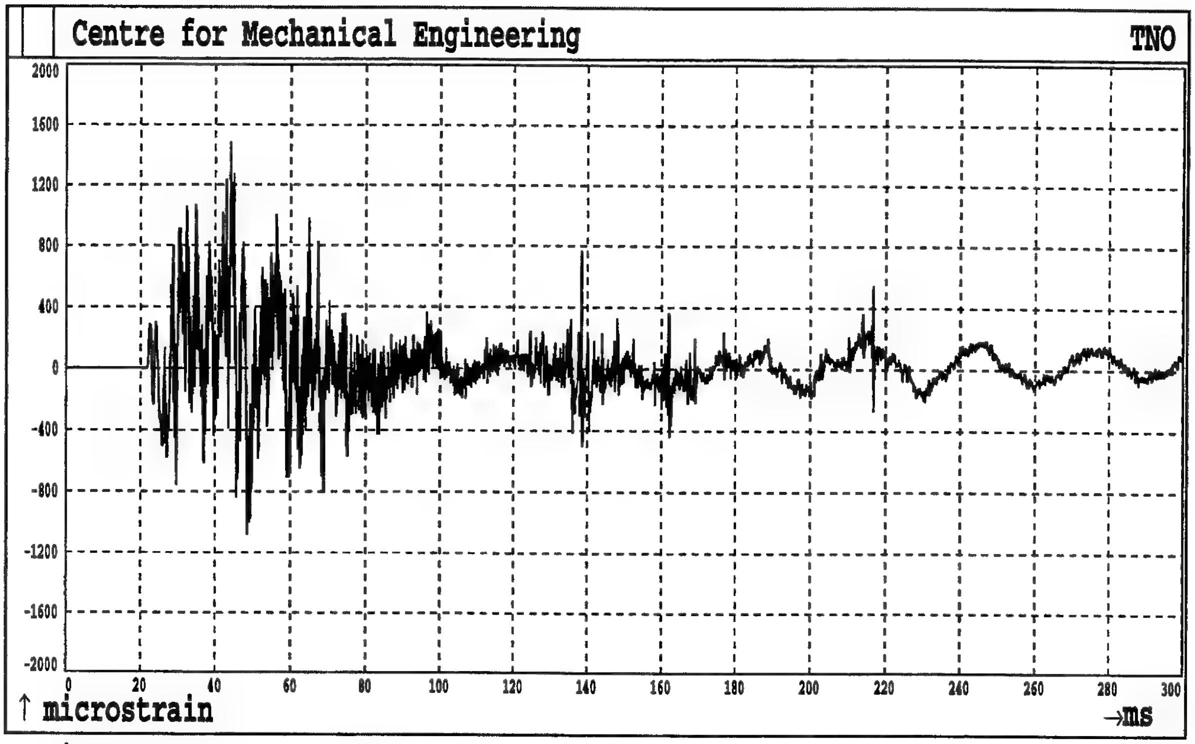


Fig.3A23. Shot 3 Sensor S24

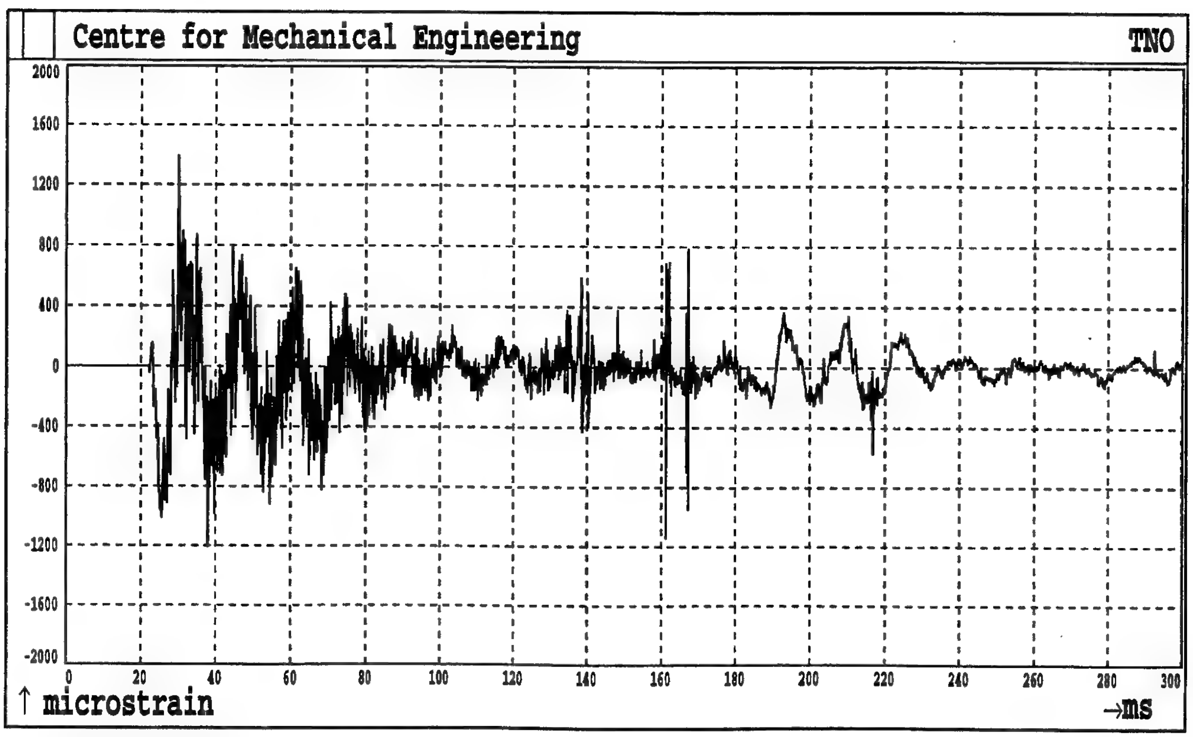


Fig.3A24. Shot 3 Sensor S25

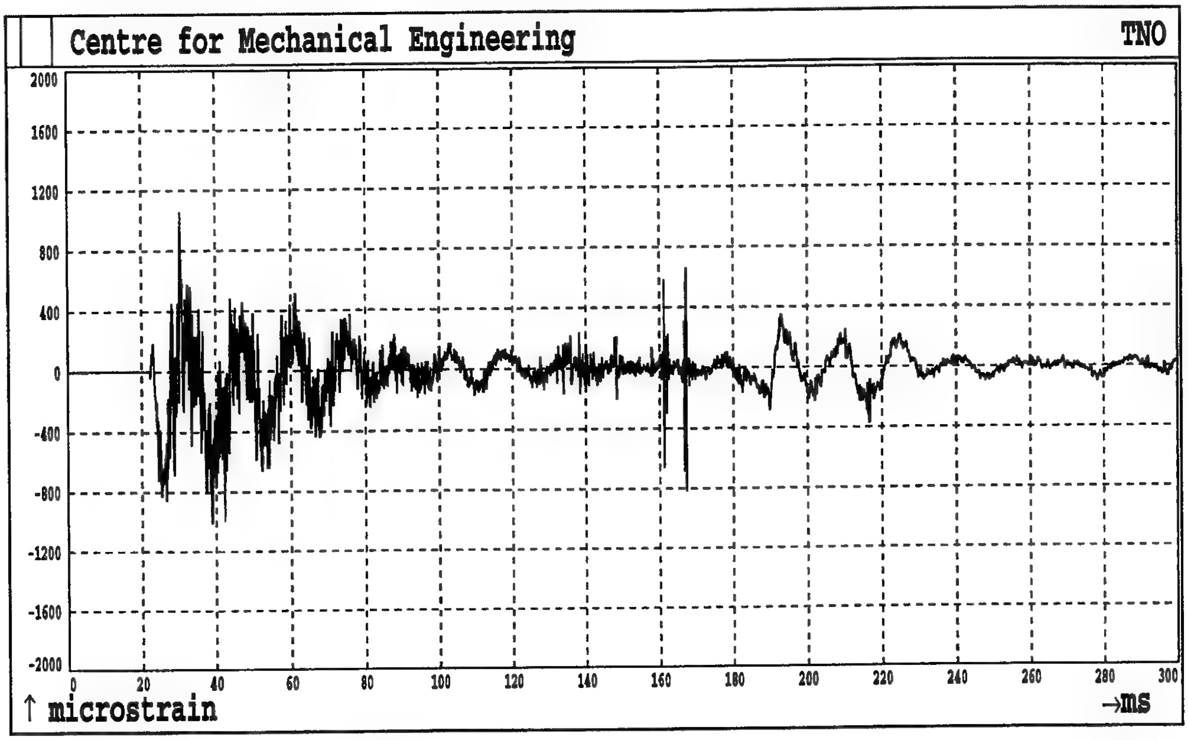


Fig.3A25. Shot 3 Sensor S26

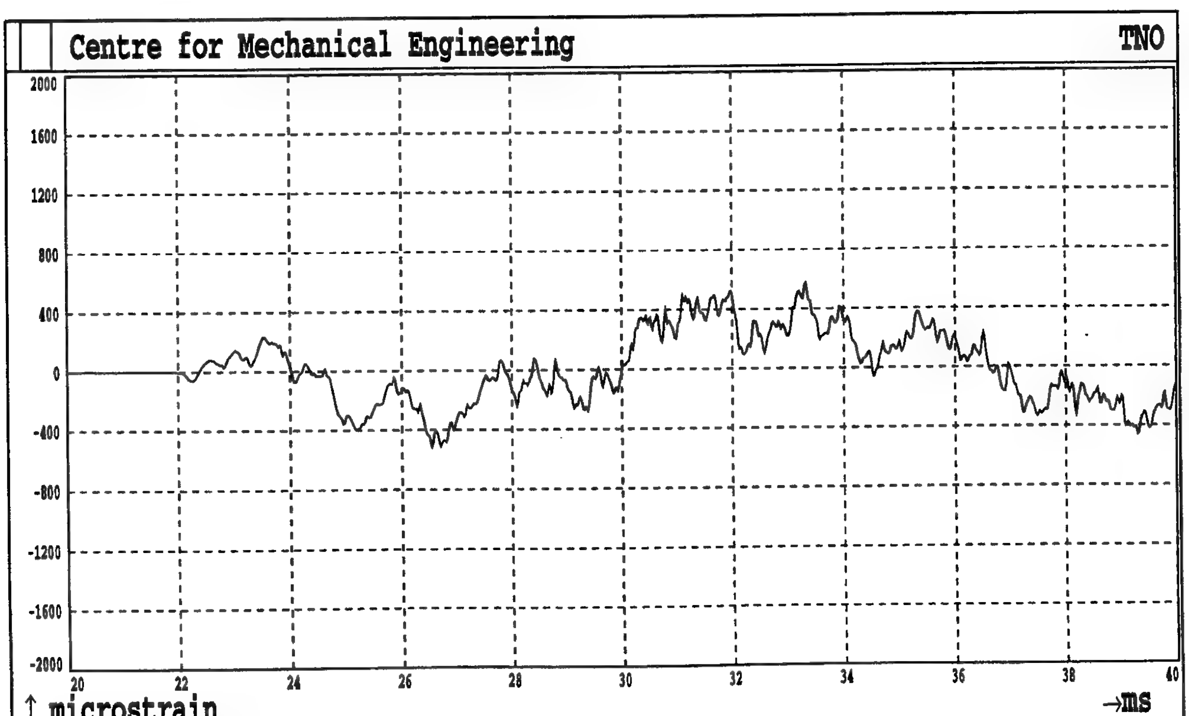


Fig.3A26. Shot 3 Sensor S1

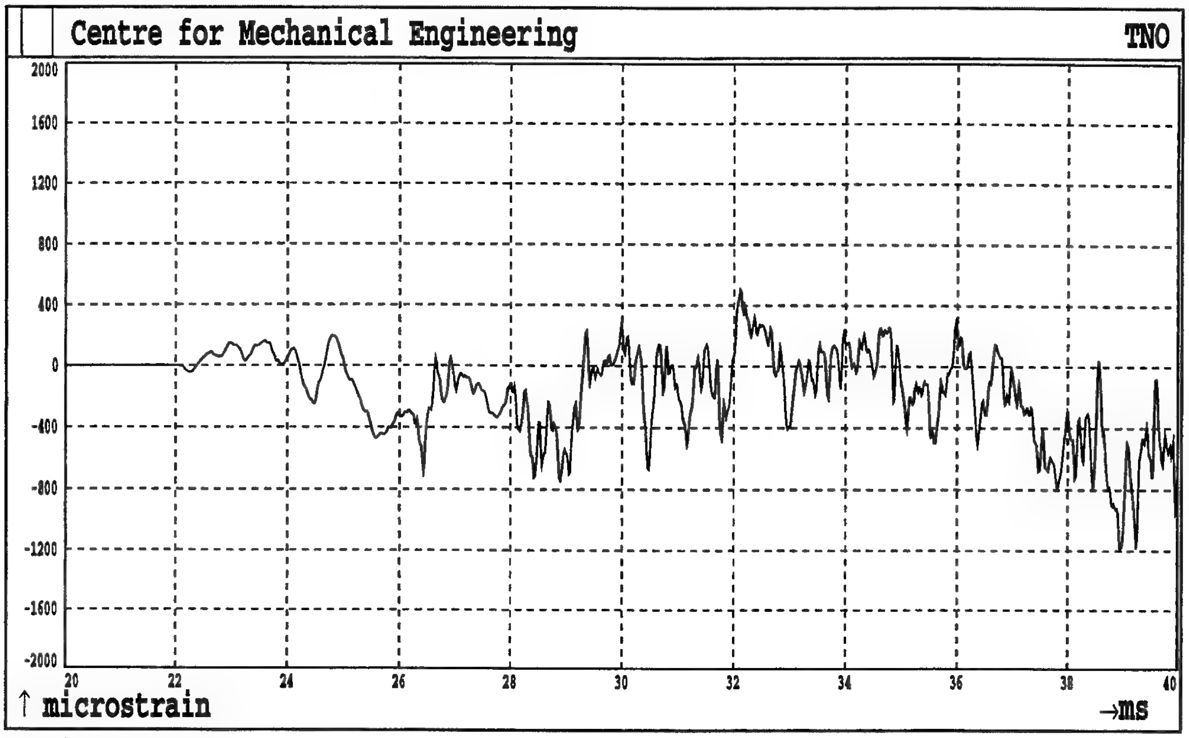


Fig.3A27. Shot 3 Sensor S2

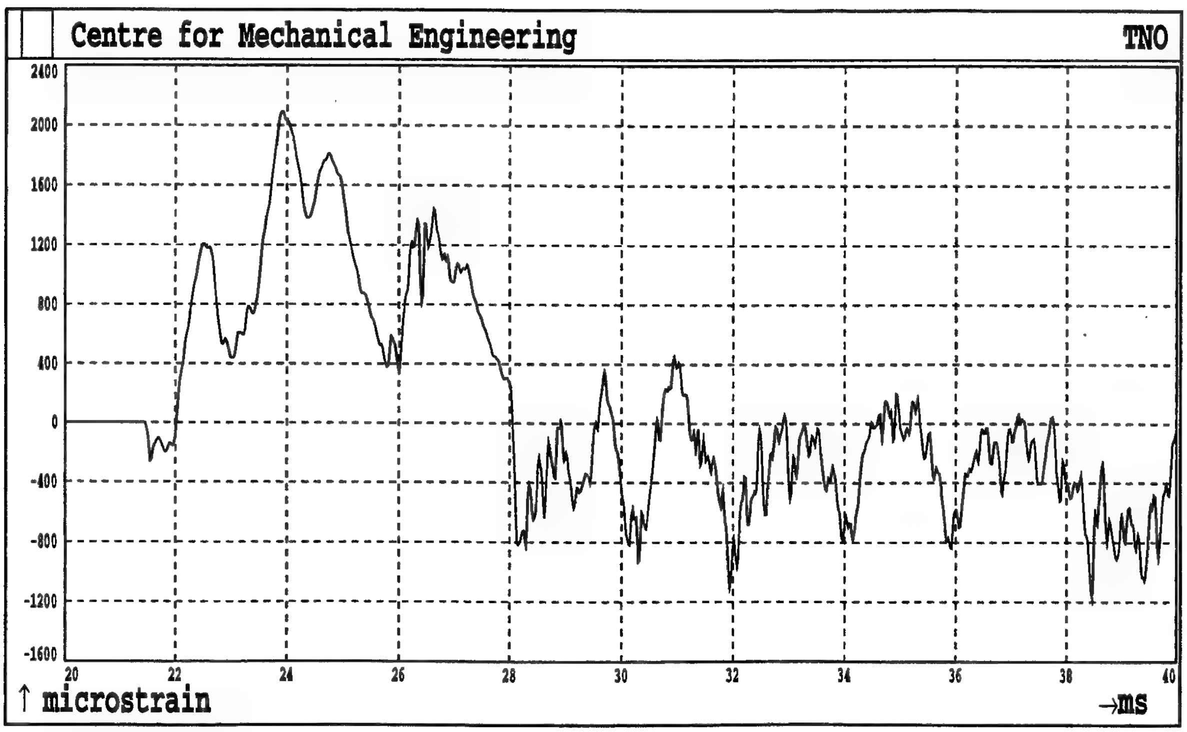


Fig.3A28. Shot 3 Sensor S3

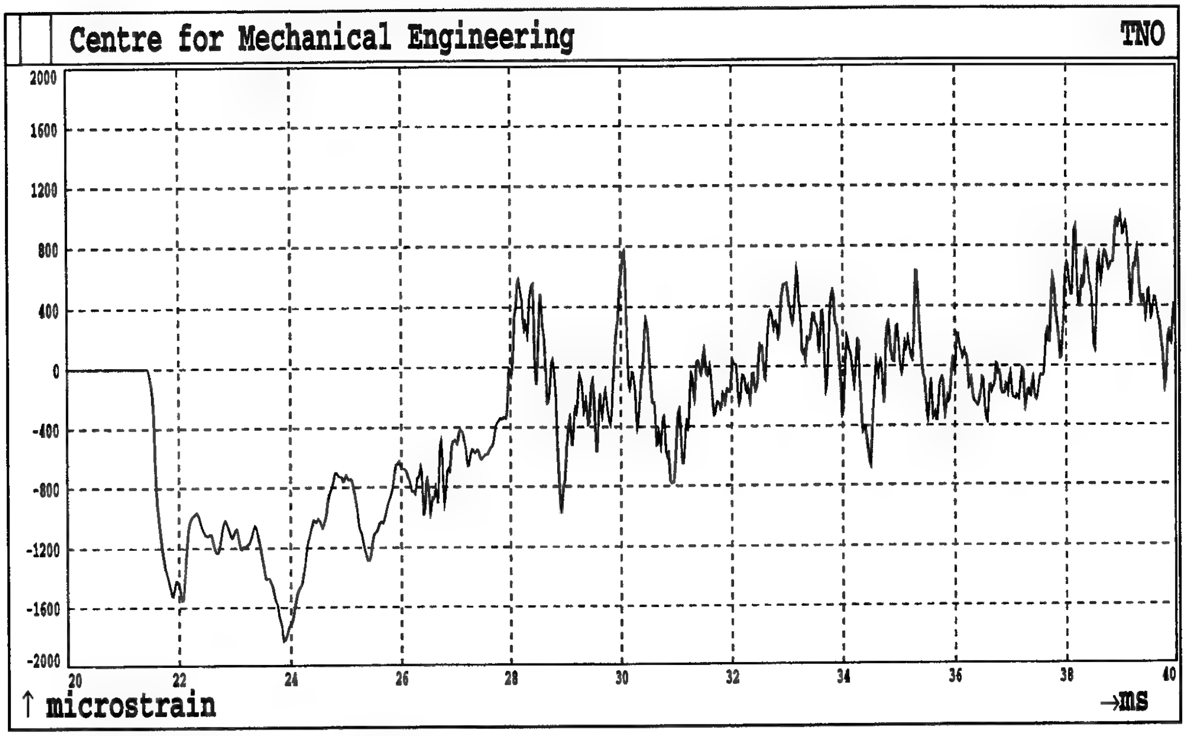


Fig.3A29. Shot 3 Sensor S4

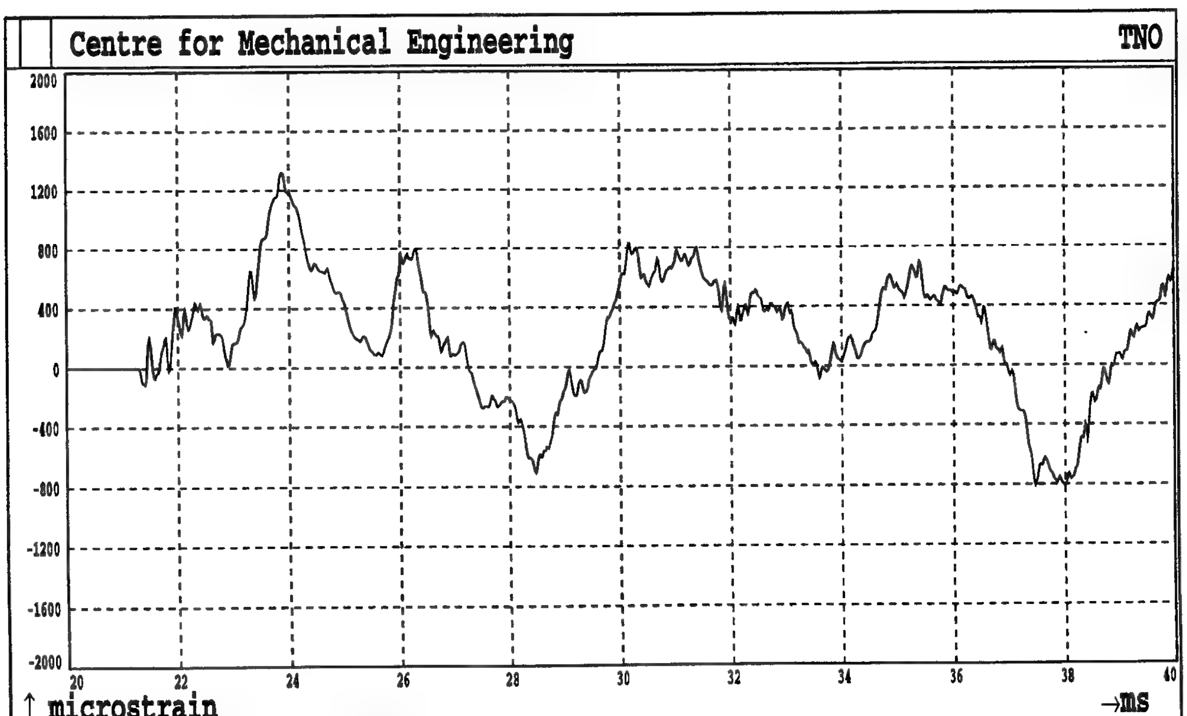


Fig.3A30. Shot 3 Sensor S5

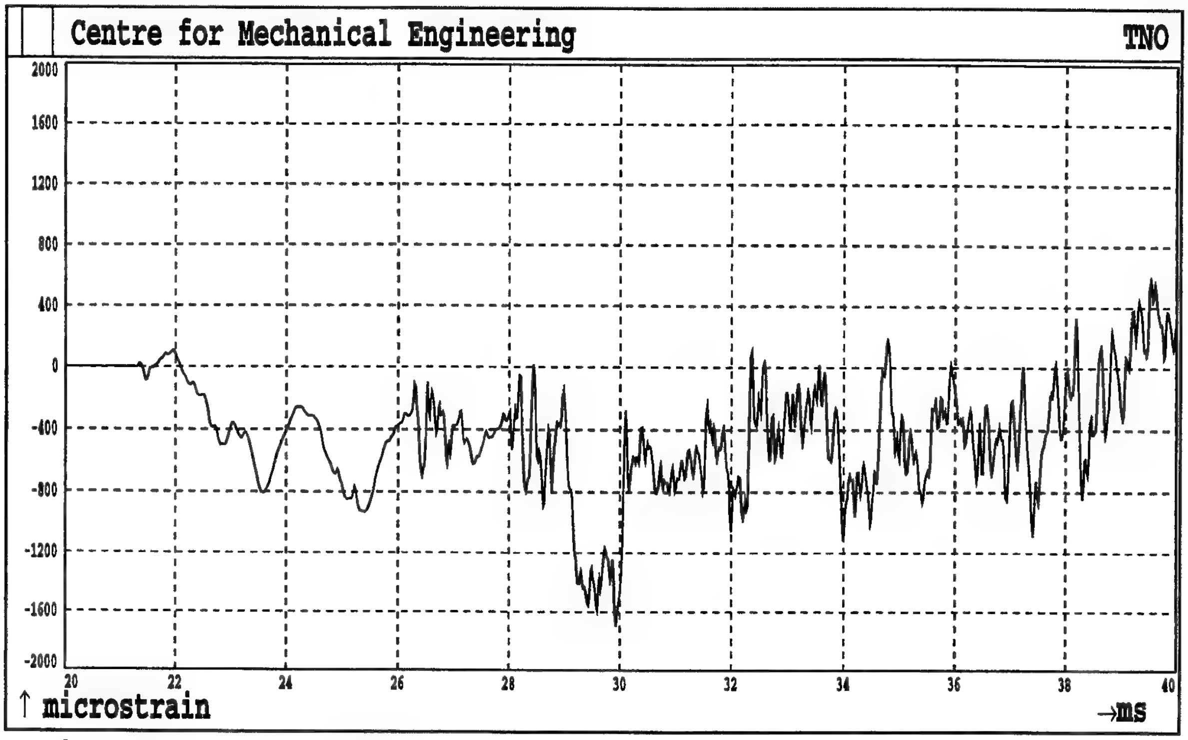


Fig.3A31. Shot 3 Sensor S6

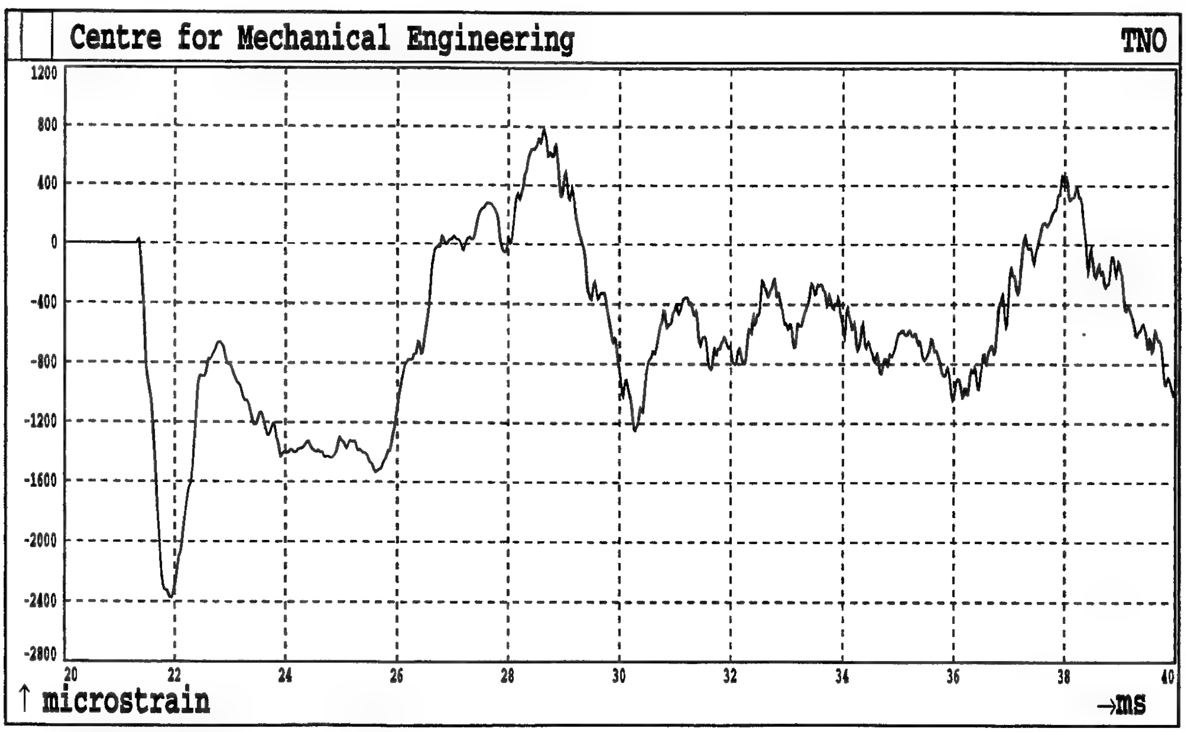


Fig.3A32. Shot 3 Sensor S7

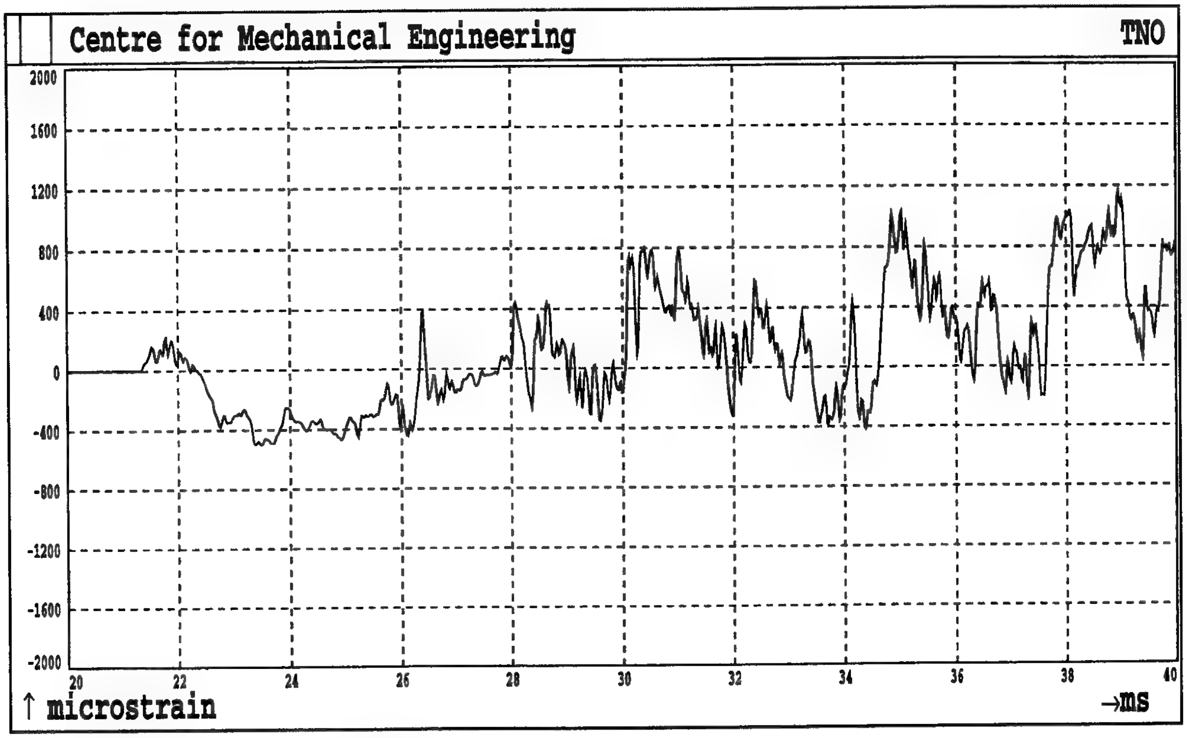


Fig.3A33. Shot 3 Sensor S8

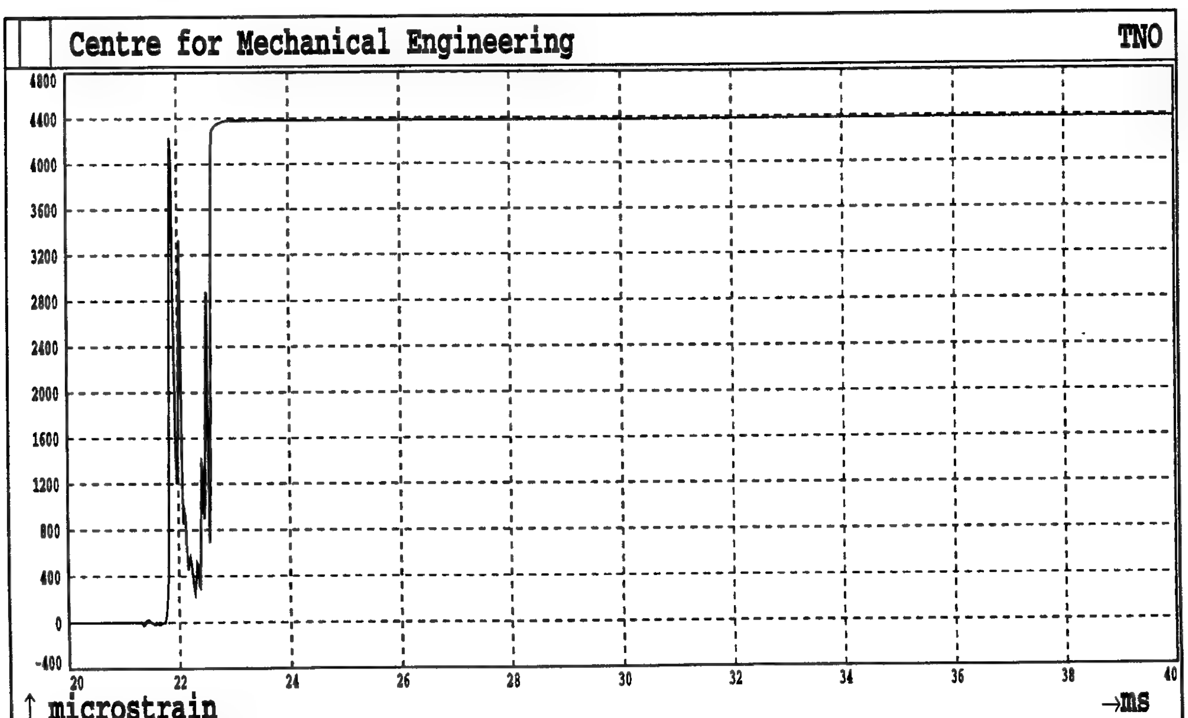


Fig.3A34. Shot 3 Sensor S10

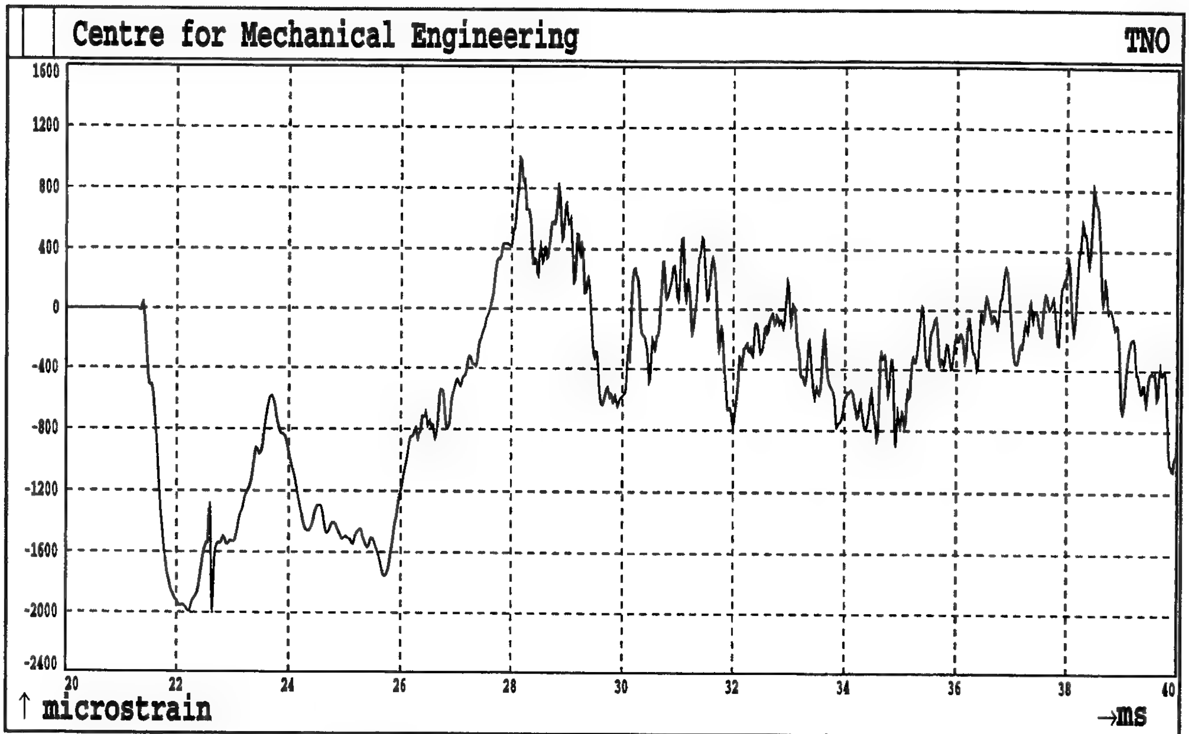


Fig.3A35. Shot 3 Sensor S11

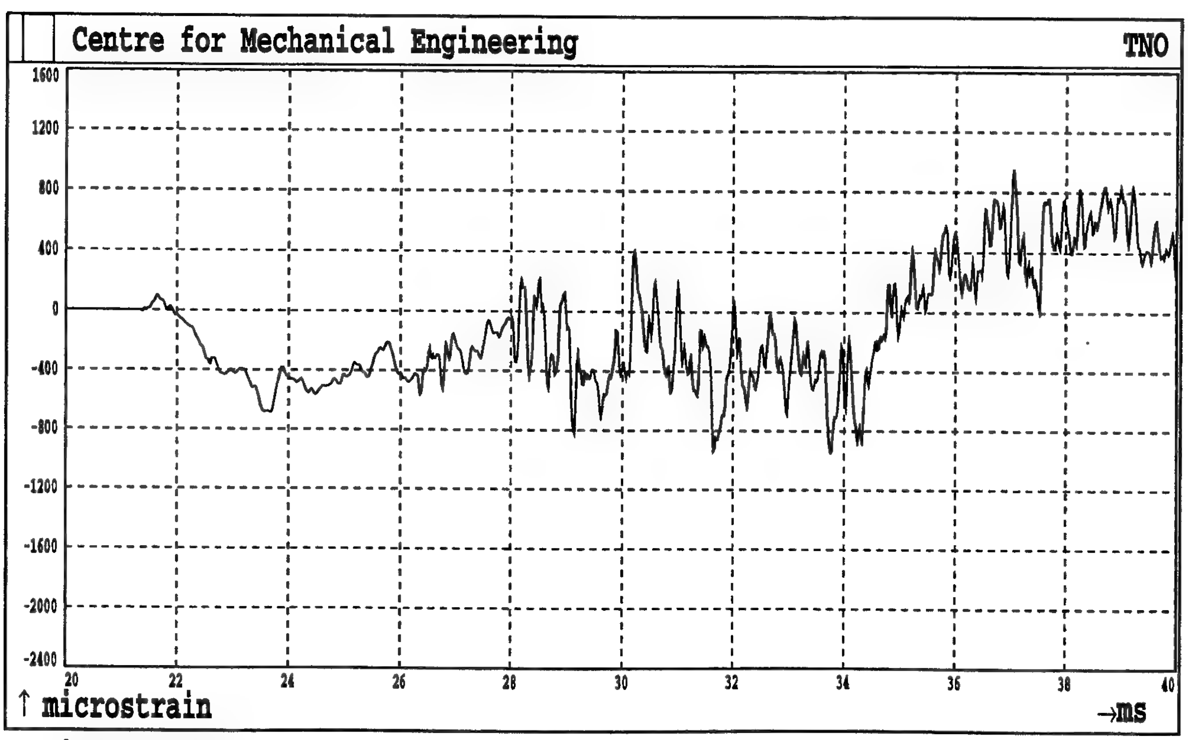


Fig.3A36. Shot 3 Sensor S12

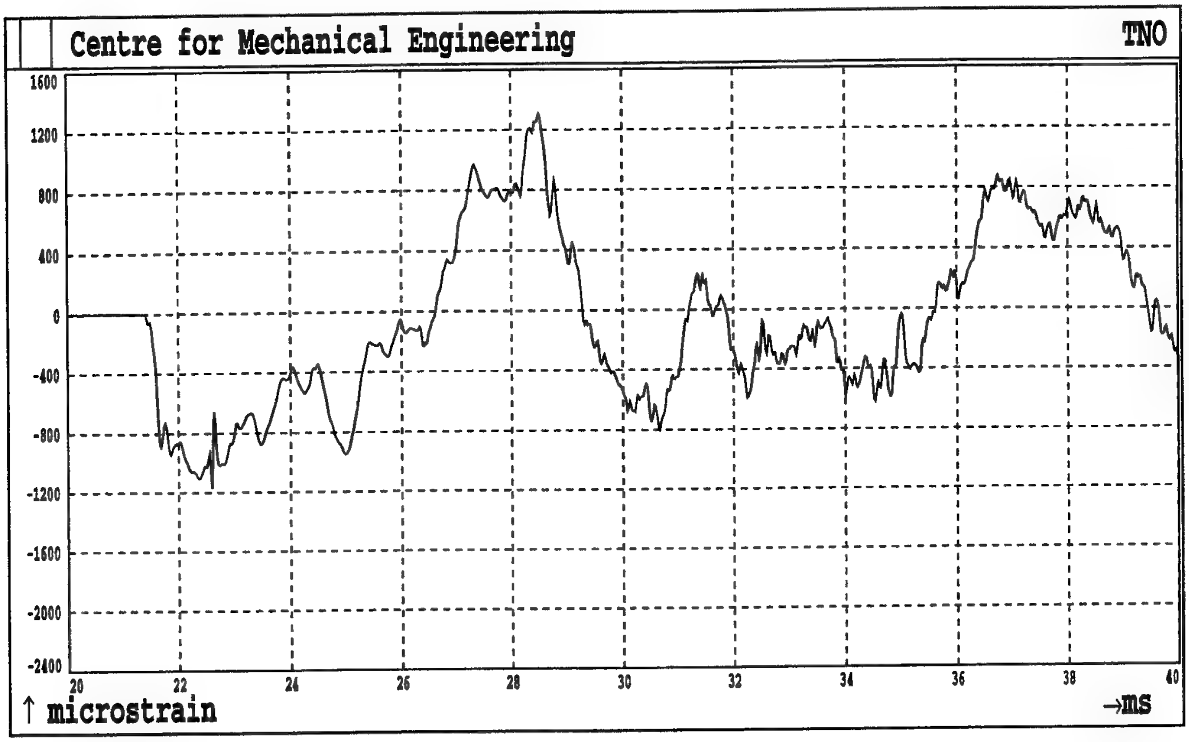


Fig.3A37. Shot 3 Sensor S13

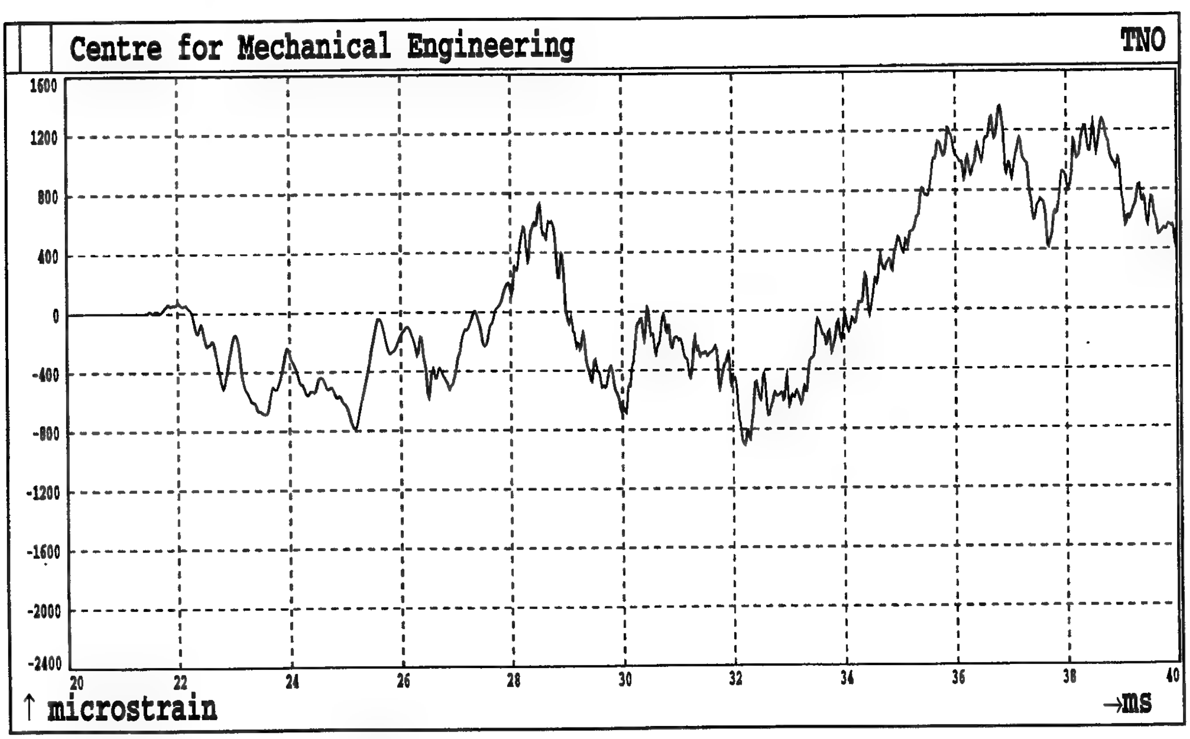


Fig.3A38. Shot 3 Sensor S14

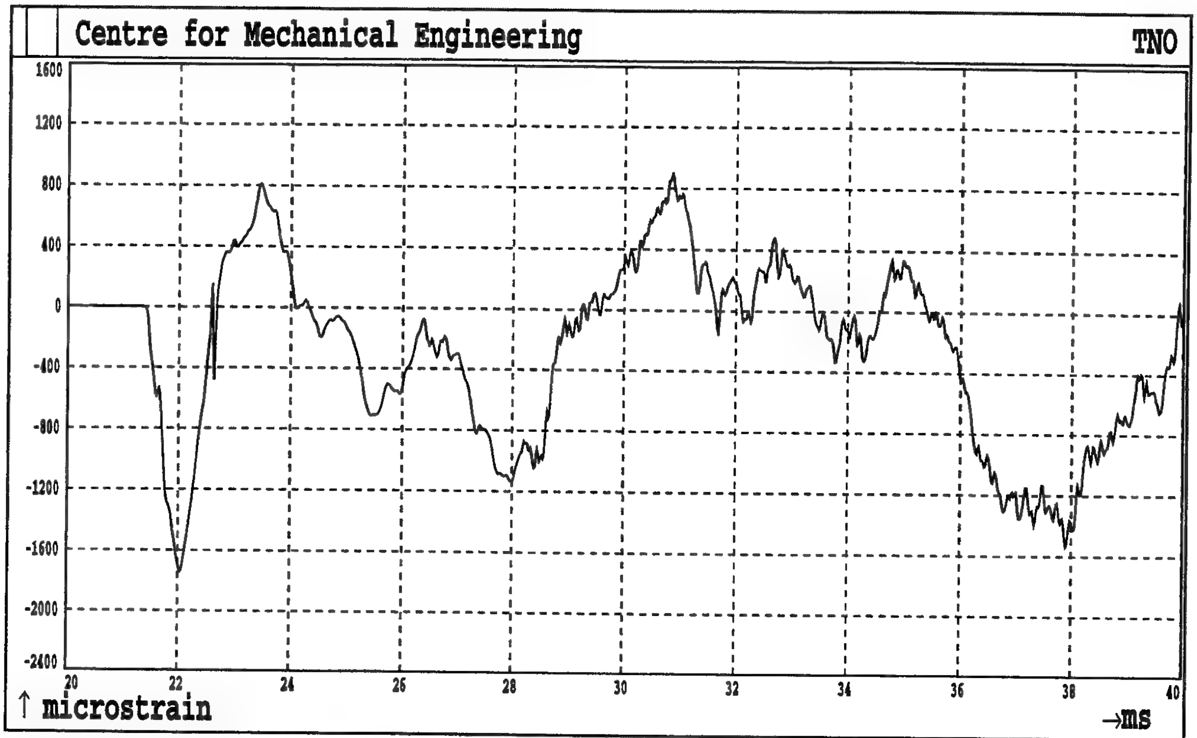


Fig.3A39. Shot 3 Sensor S15

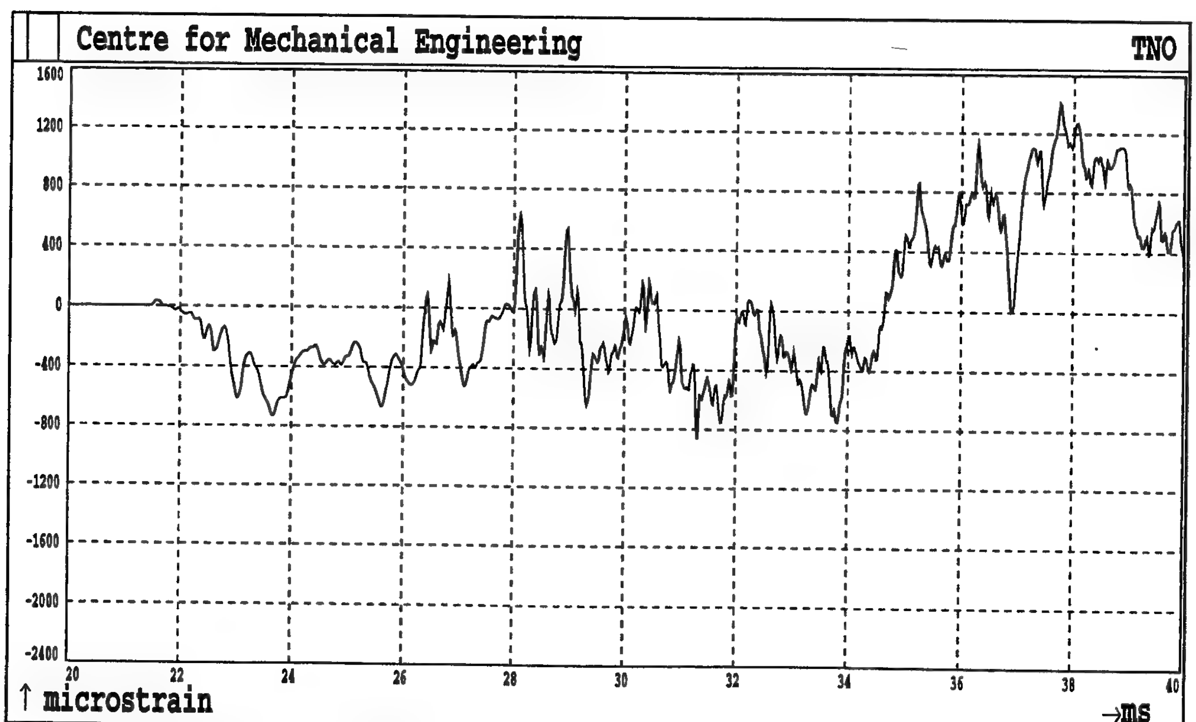


Fig.3A40. Shot 3 Sensor S16

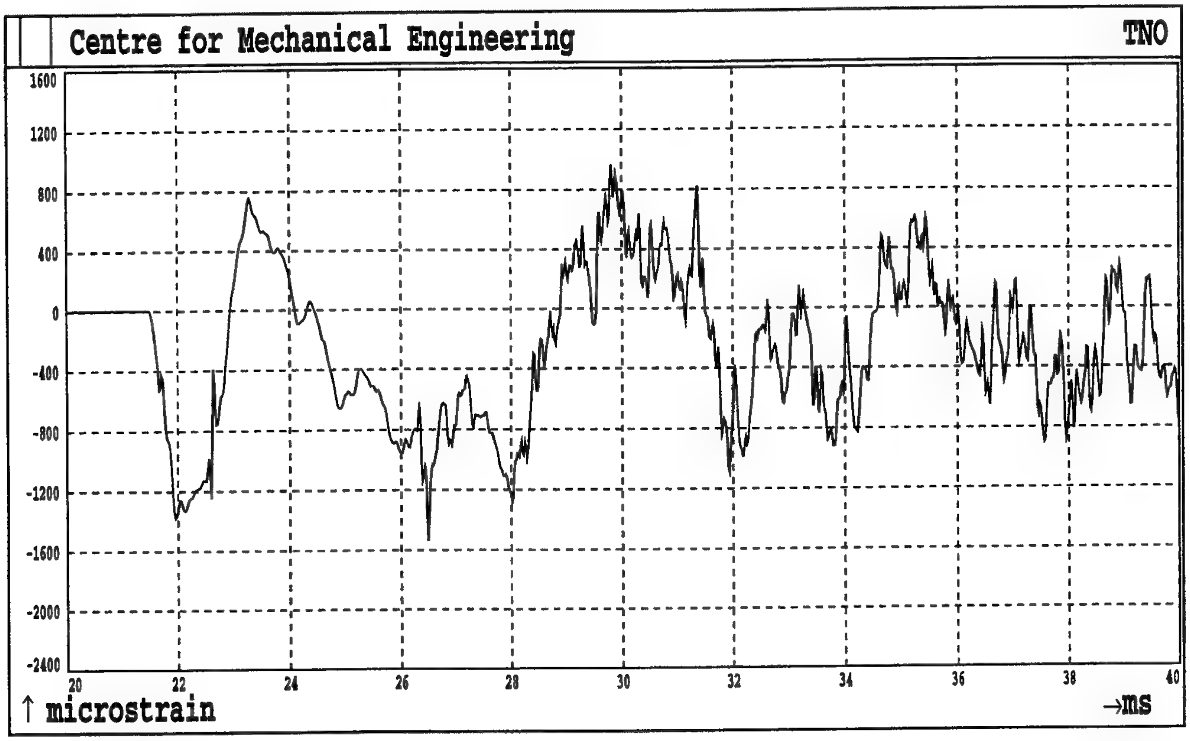


Fig.3A41. Shot 3 Sensor S17

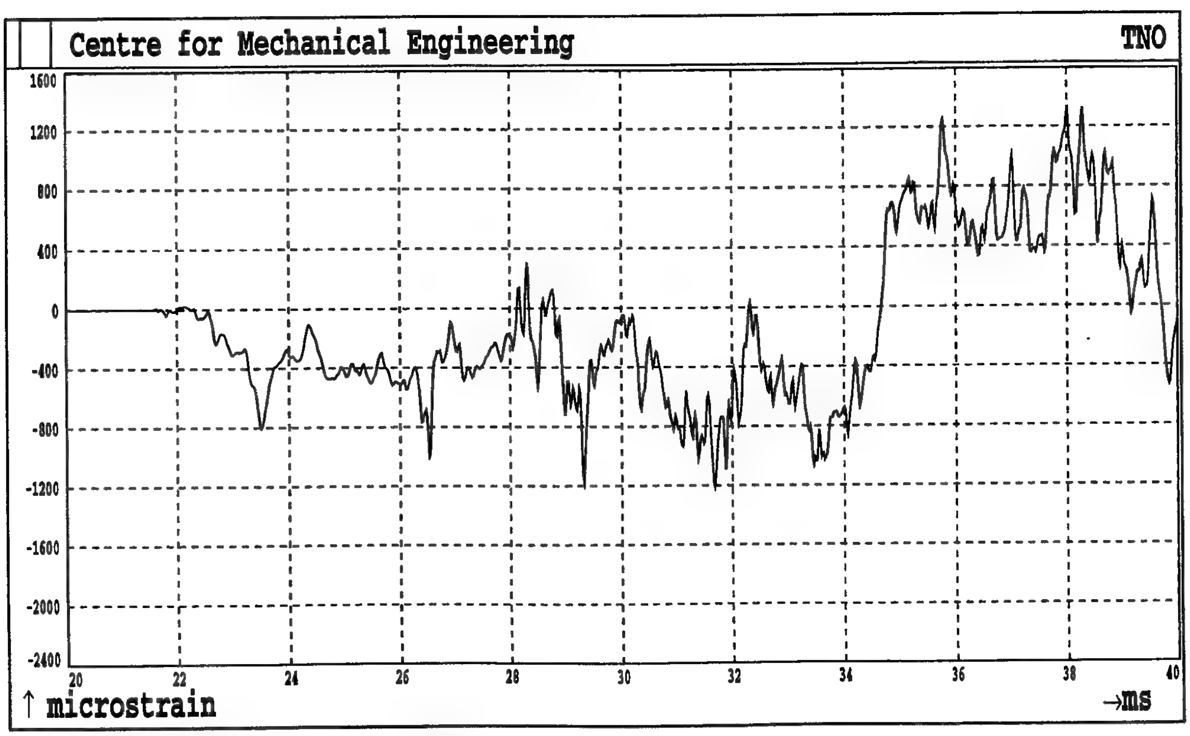


Fig.3A42. Shot 3 Sensor S18

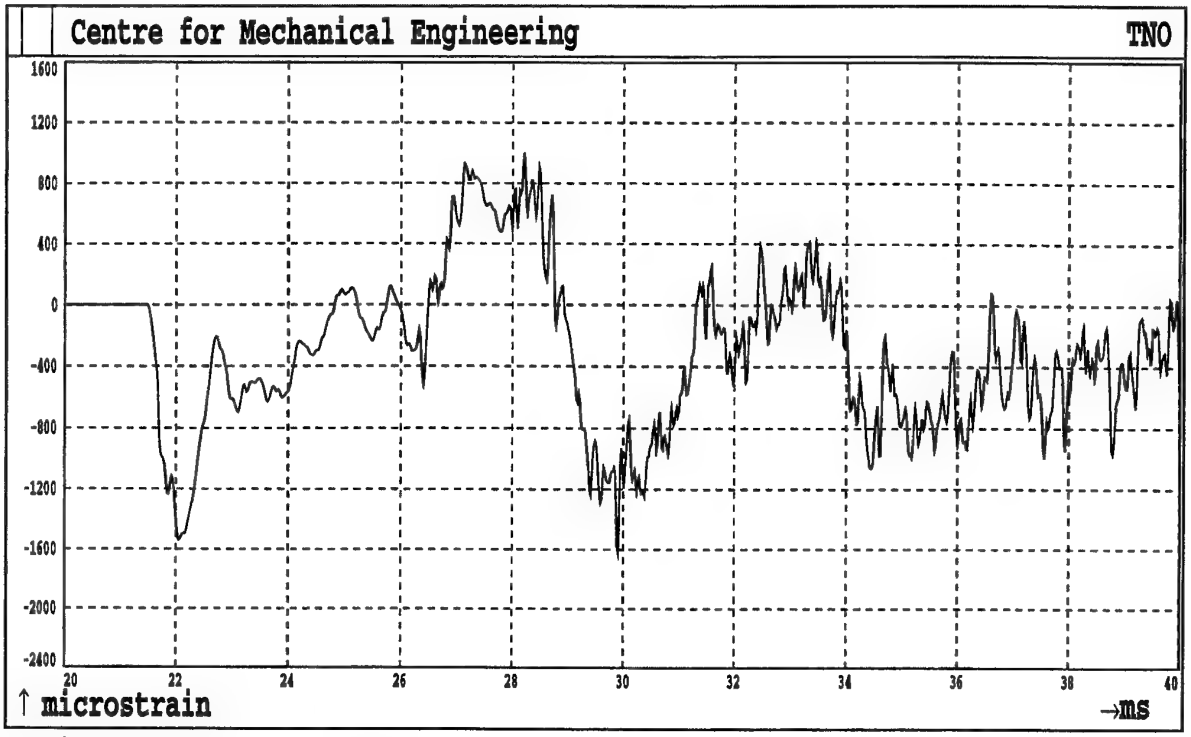


Fig.3A43. Shot 3 Sensor S19

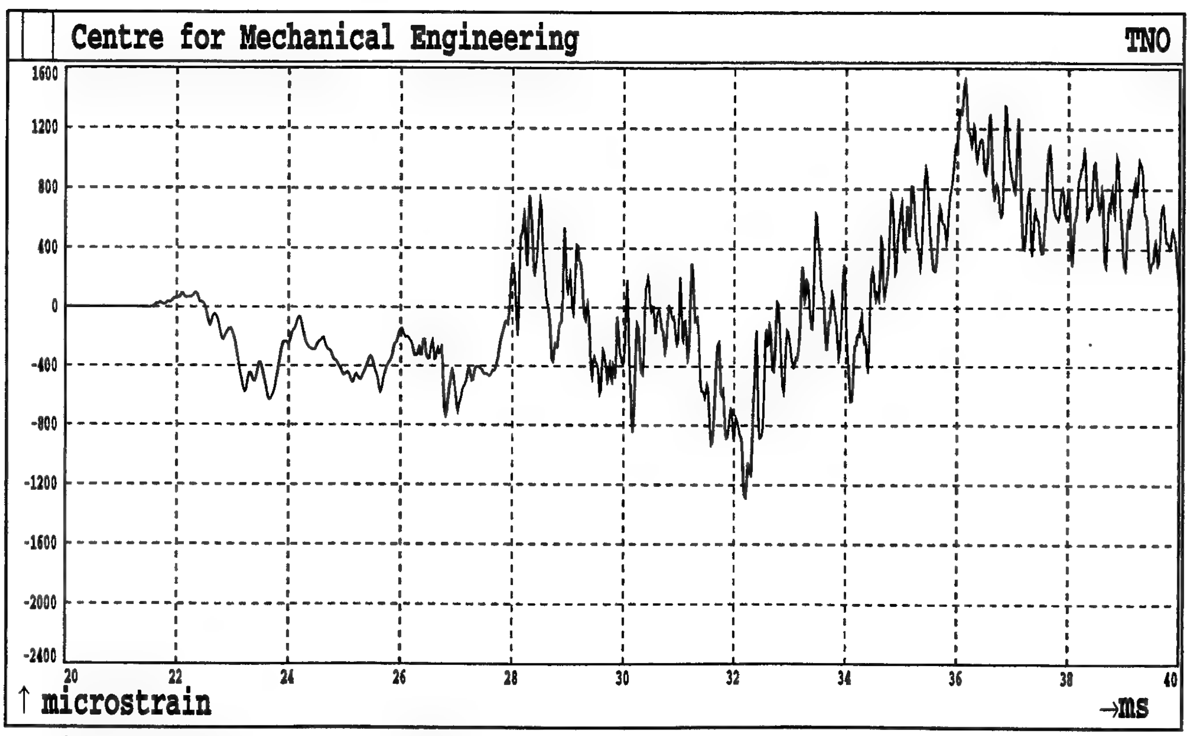


Fig.3A44. Shot 3 Sensor S20

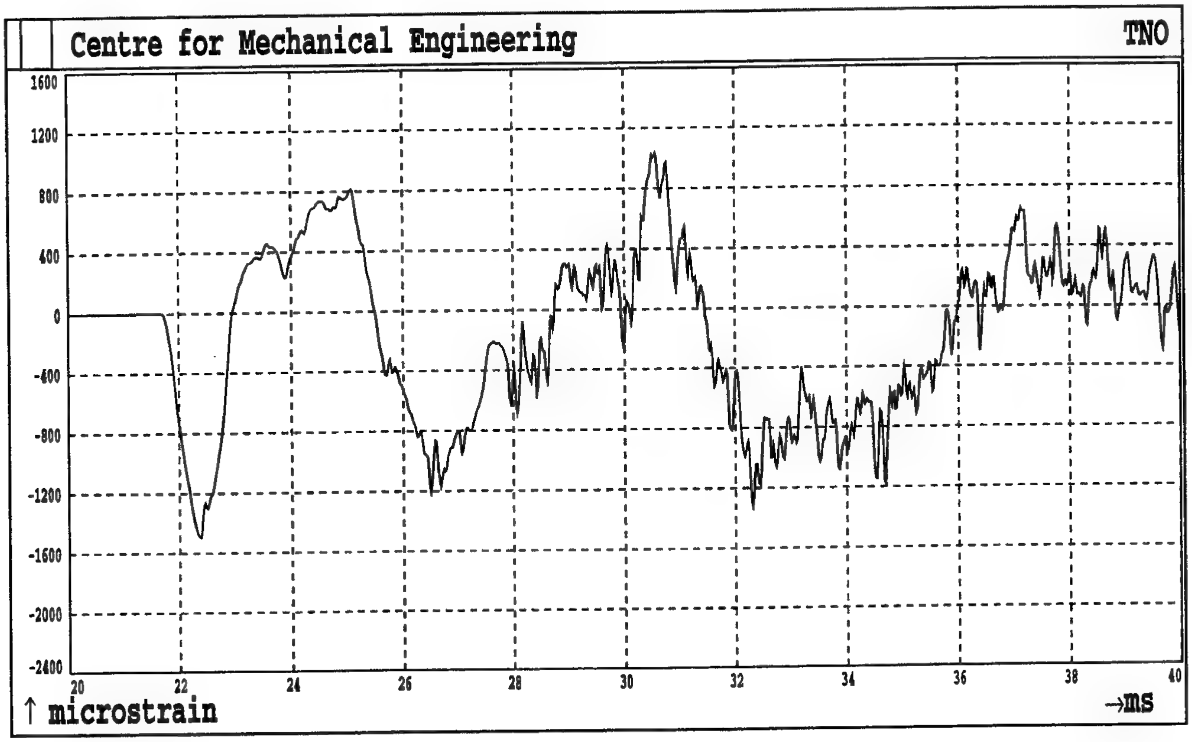


Fig.3A45. Shot 3 Sensor S21

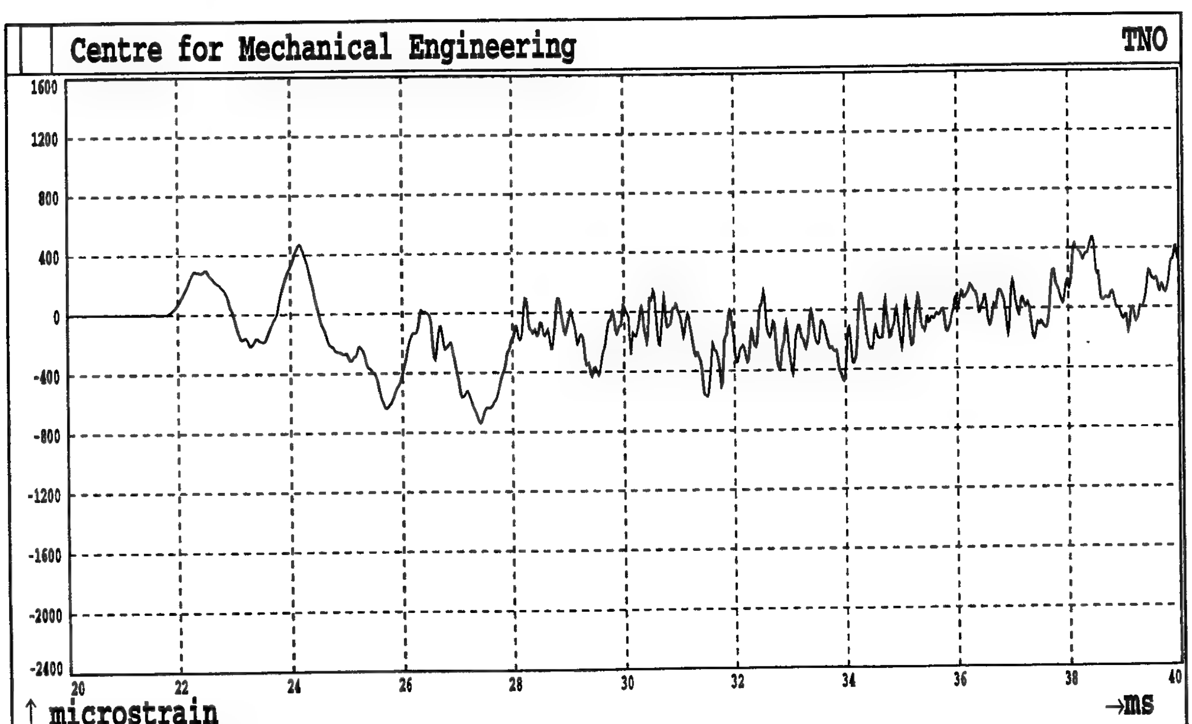


Fig.3A46. Shot 3 Sensor S22

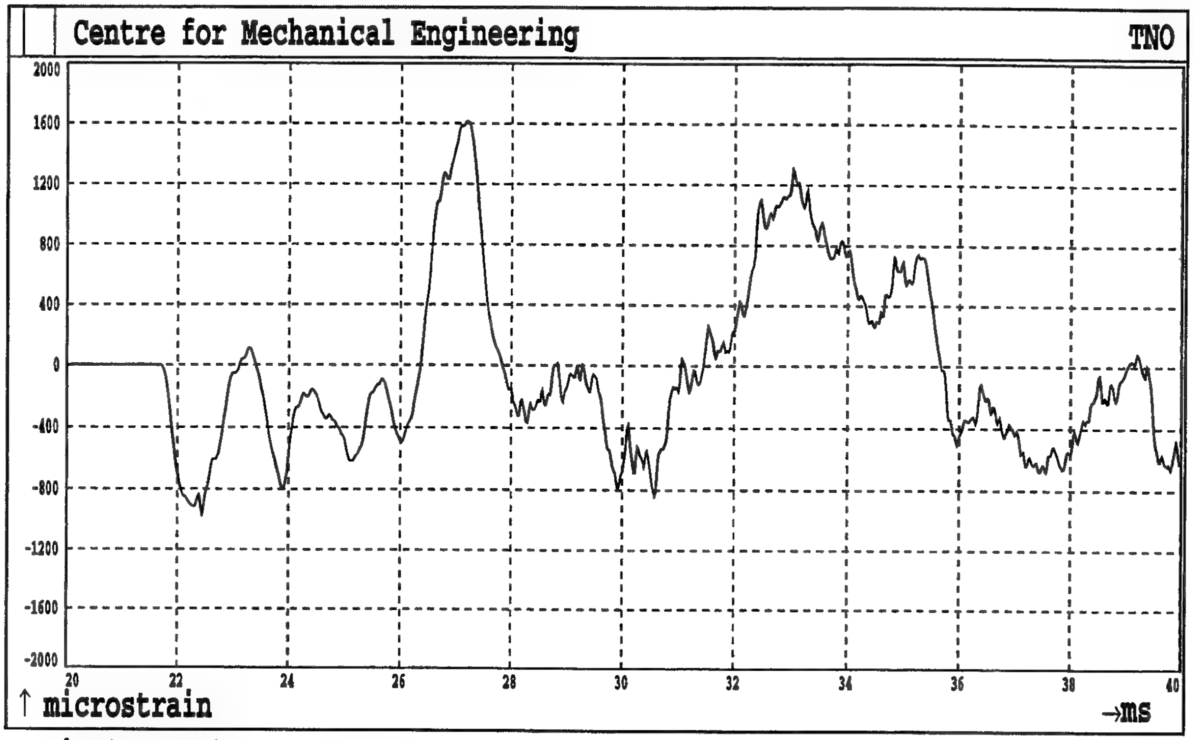


Fig.3A47. Shot 3 Sensor S23

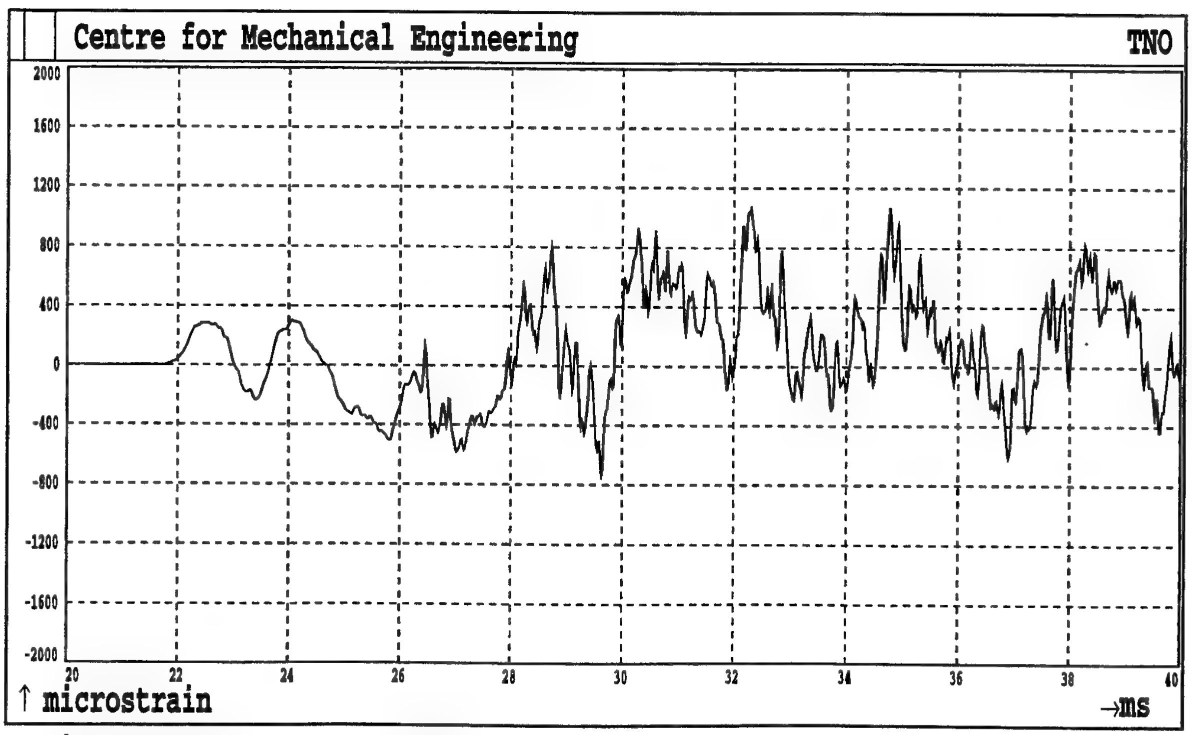


Fig.3A48. Shot 3 Sensor S24

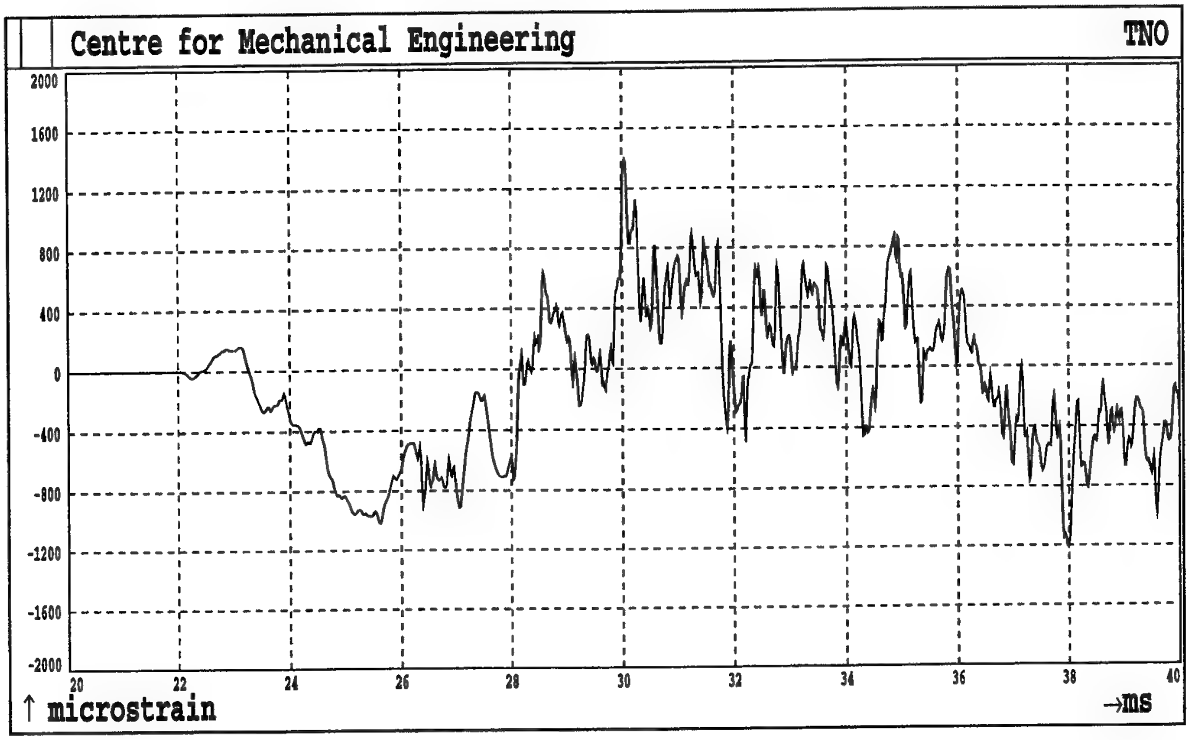


Fig.3A49. Shot 3 Sensor S25

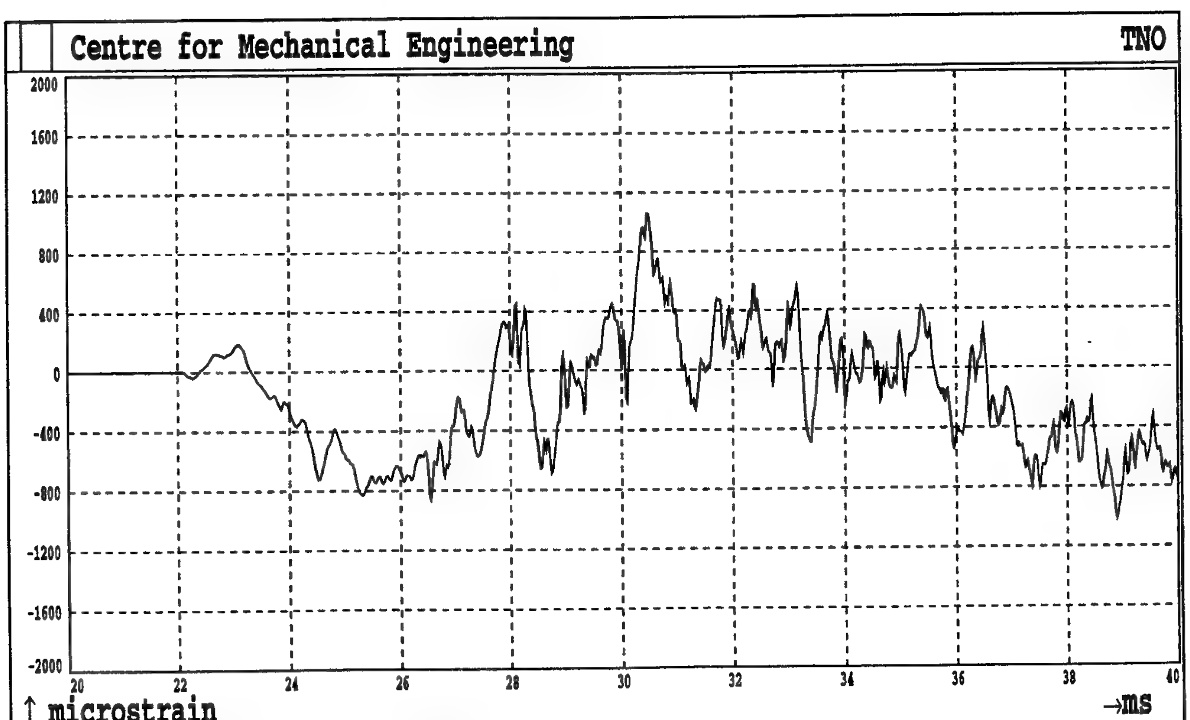


Fig.3A50. Shot 3 Sensor S26

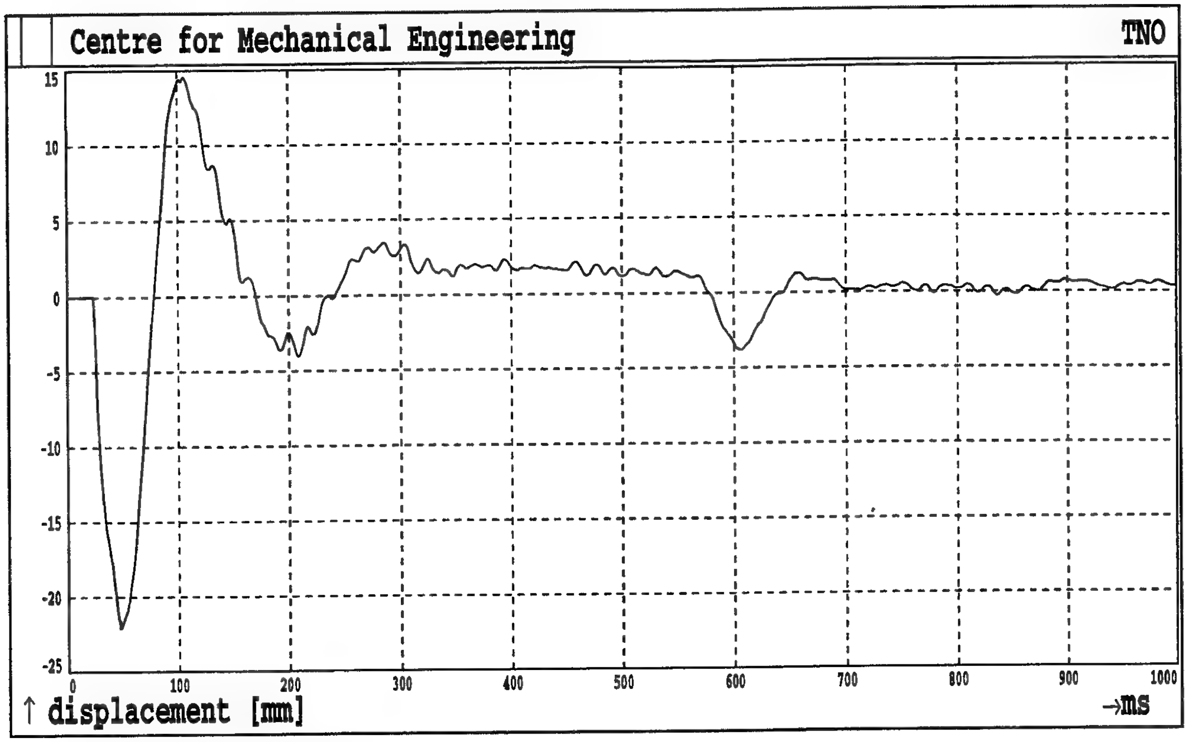


Fig.1B1. Shot 1 Sensor R1

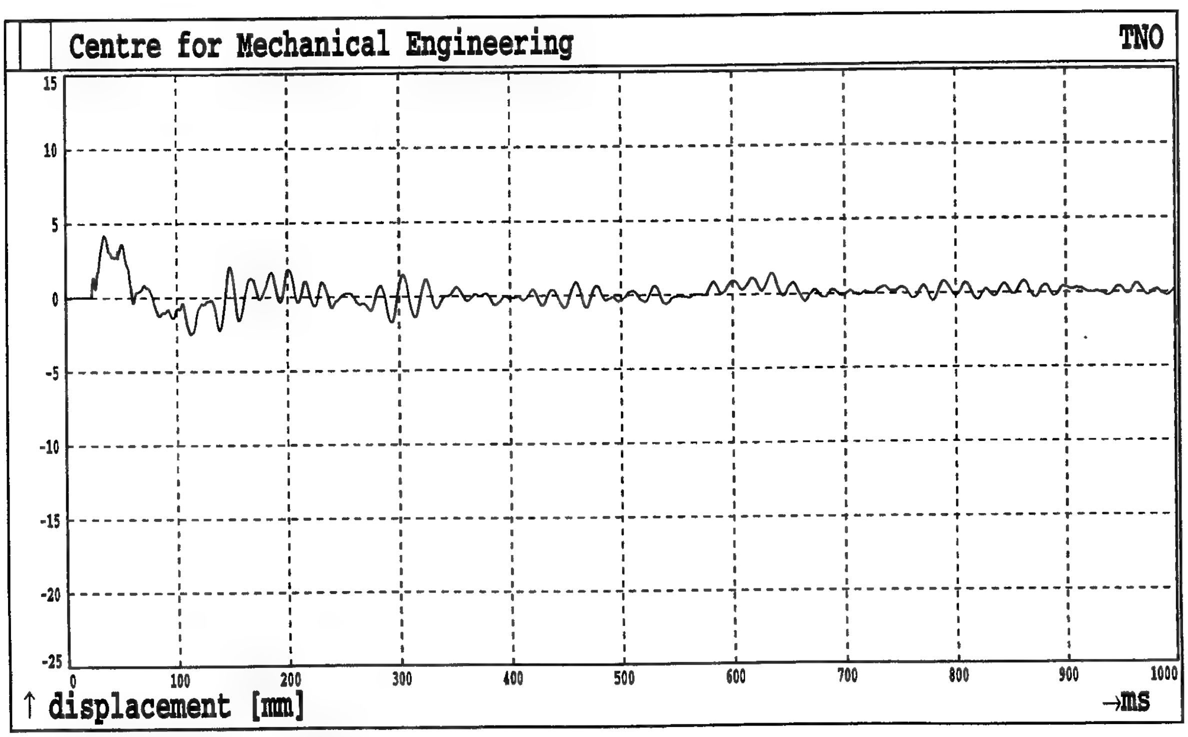


Fig.1B2. Shot 1 Sensor R2

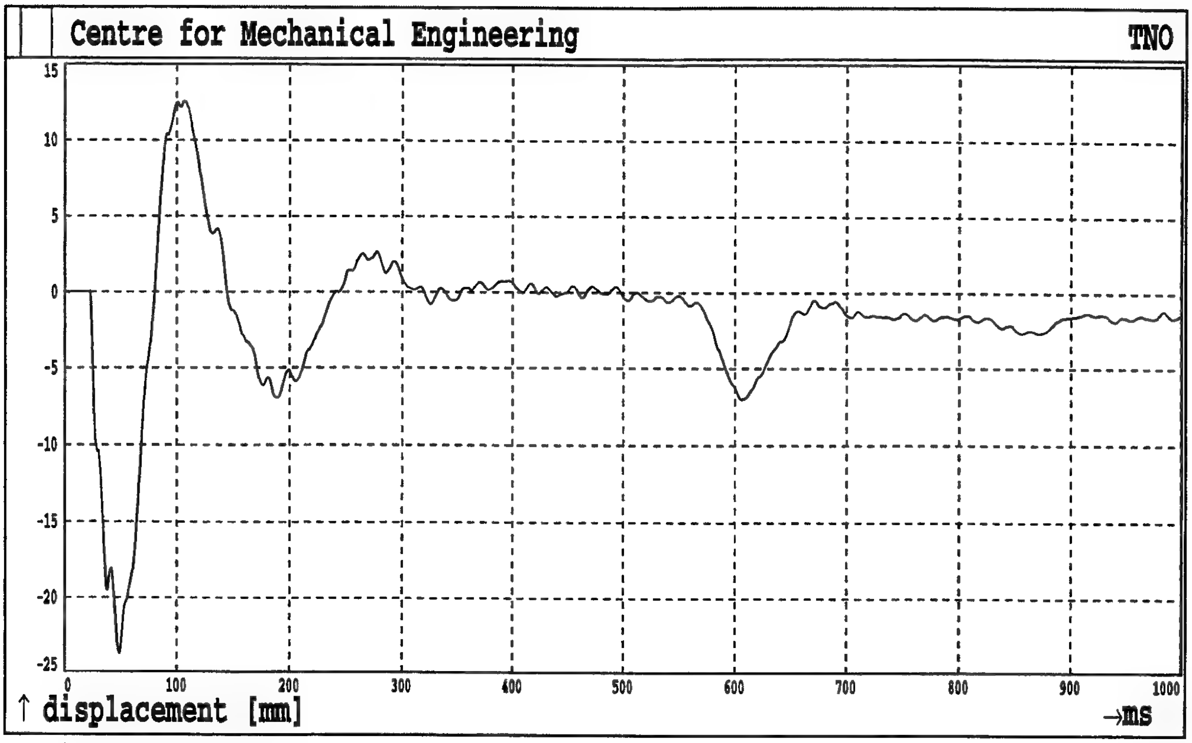


Fig.1B3. Shot 1 Sensor R3

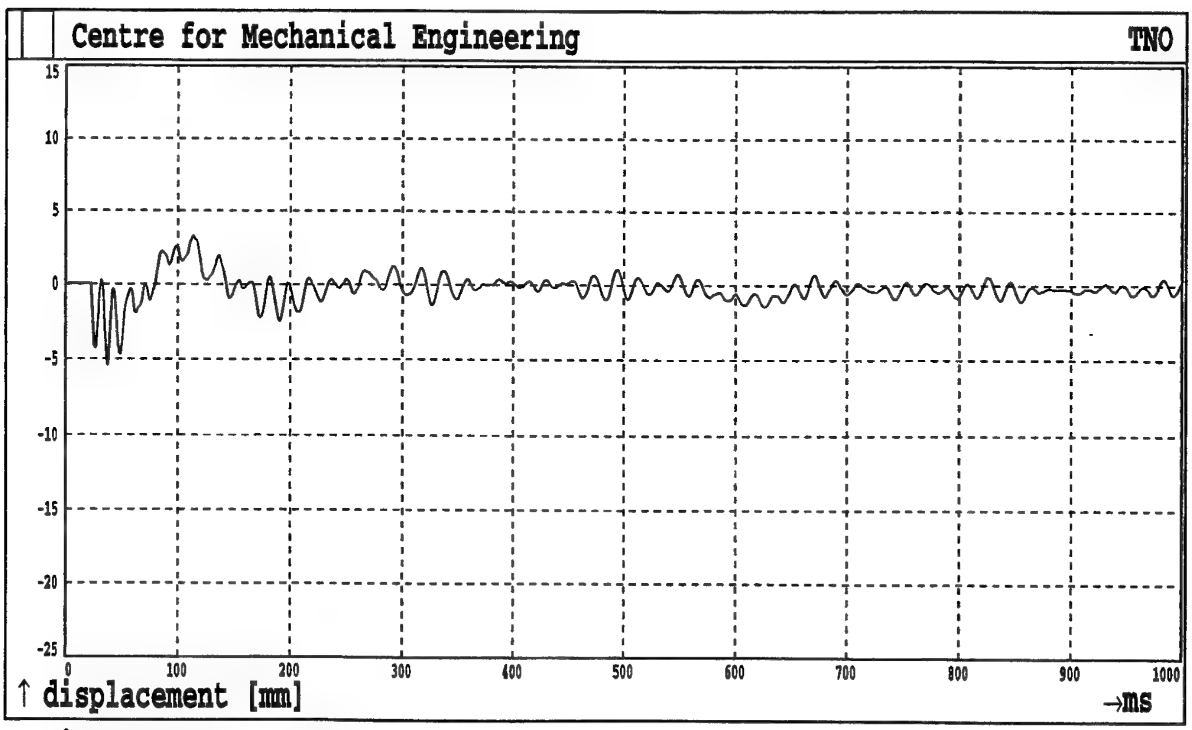


Fig.1B4. Shot 1 Sensor R4

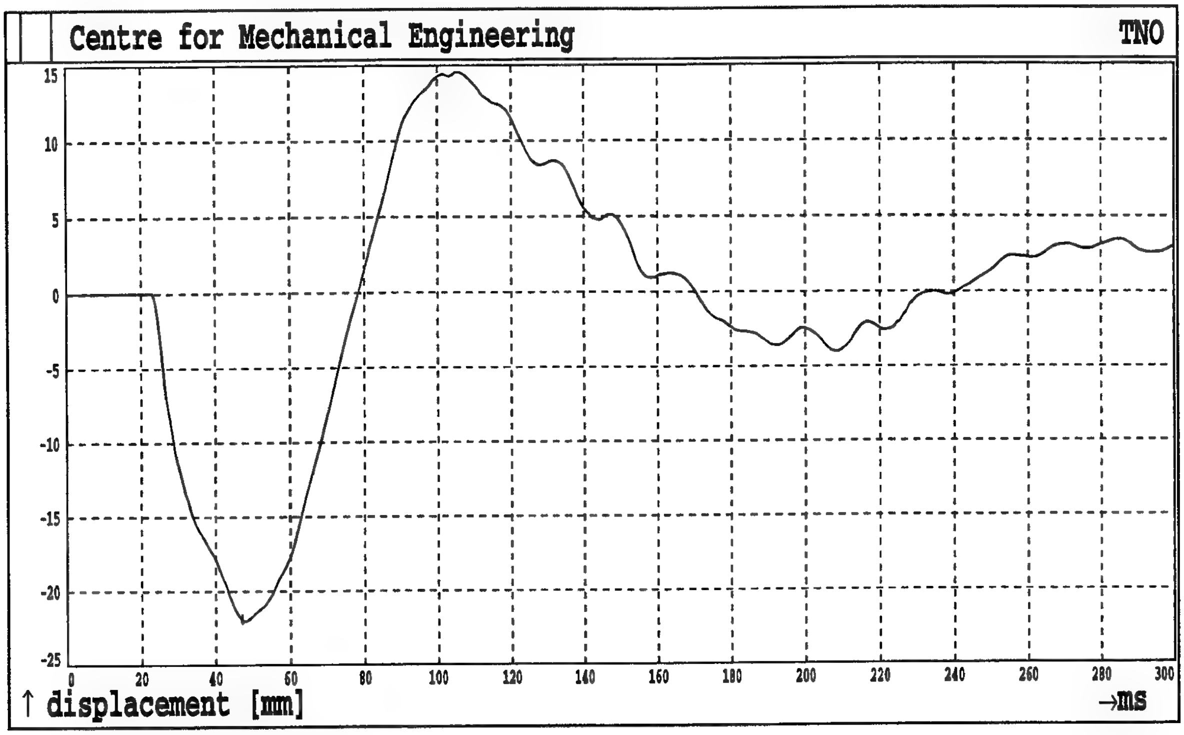


Fig.1B5. Shot 1 Sensor R1

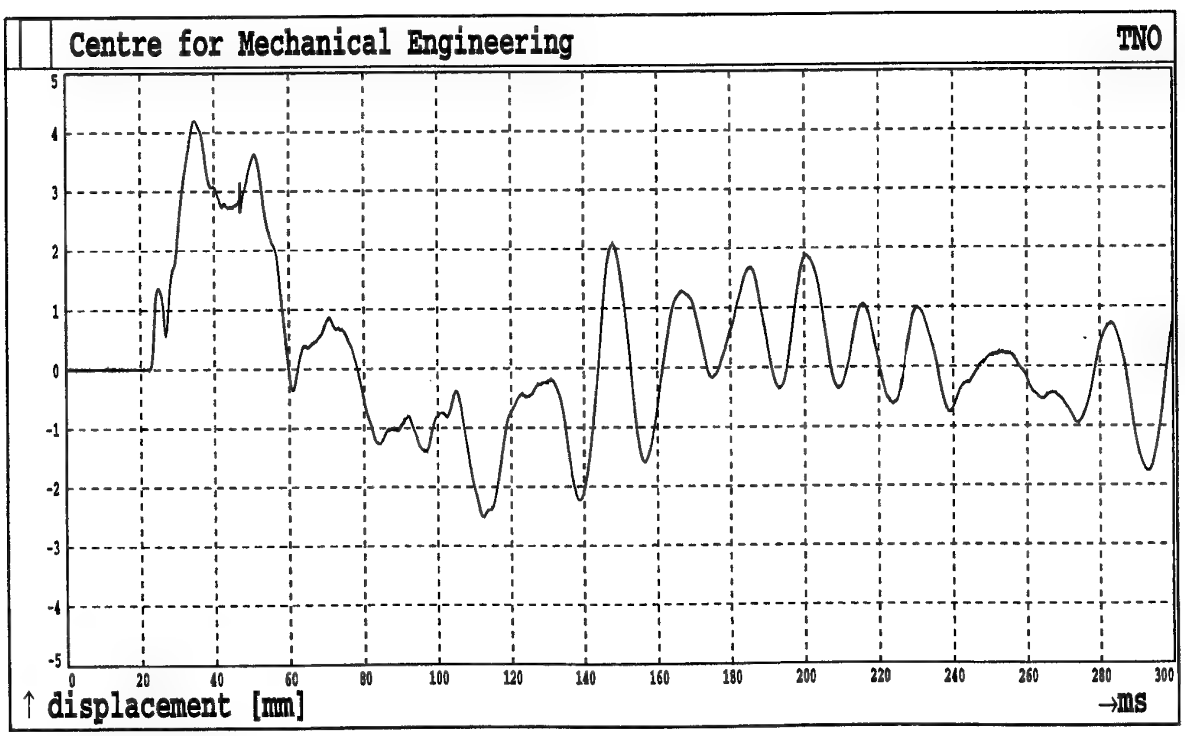


Fig.1B6. Shot 1 Sensor R2

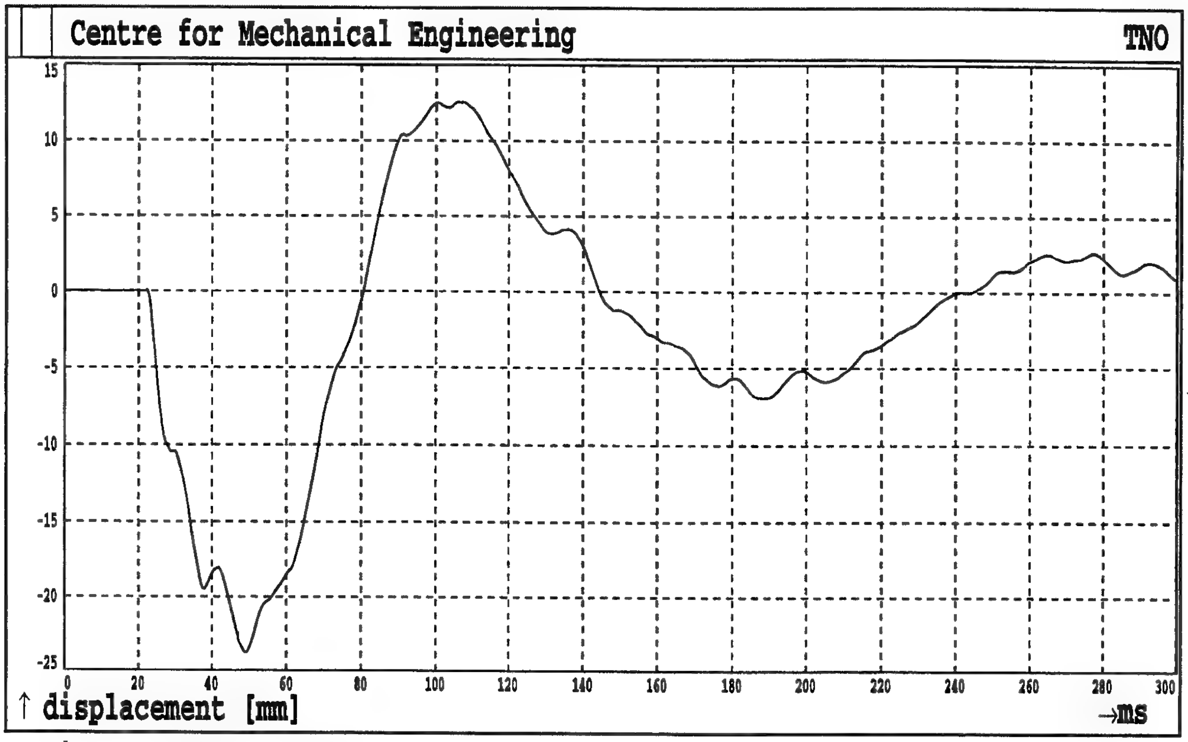


Fig.1B7. Shot 1 Sensor R3

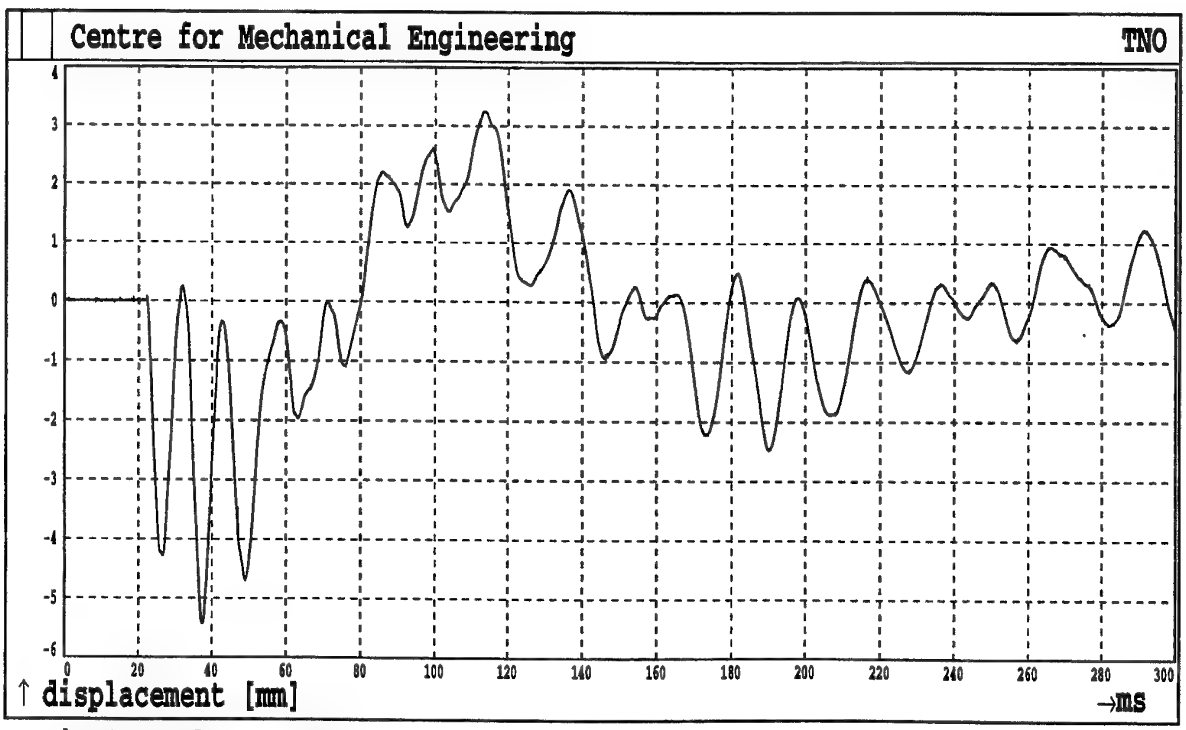


Fig.1B8. Shot 1 Sensor R4

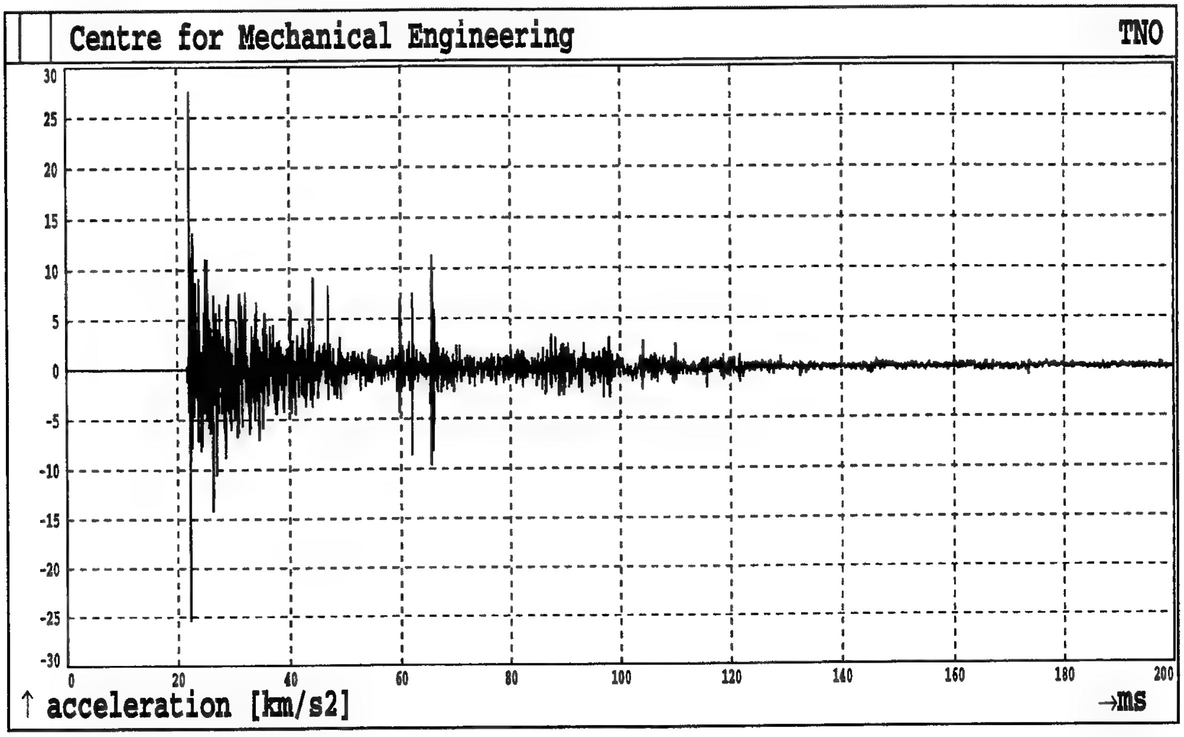


Fig.1B9. Shot 1 Sensor A1

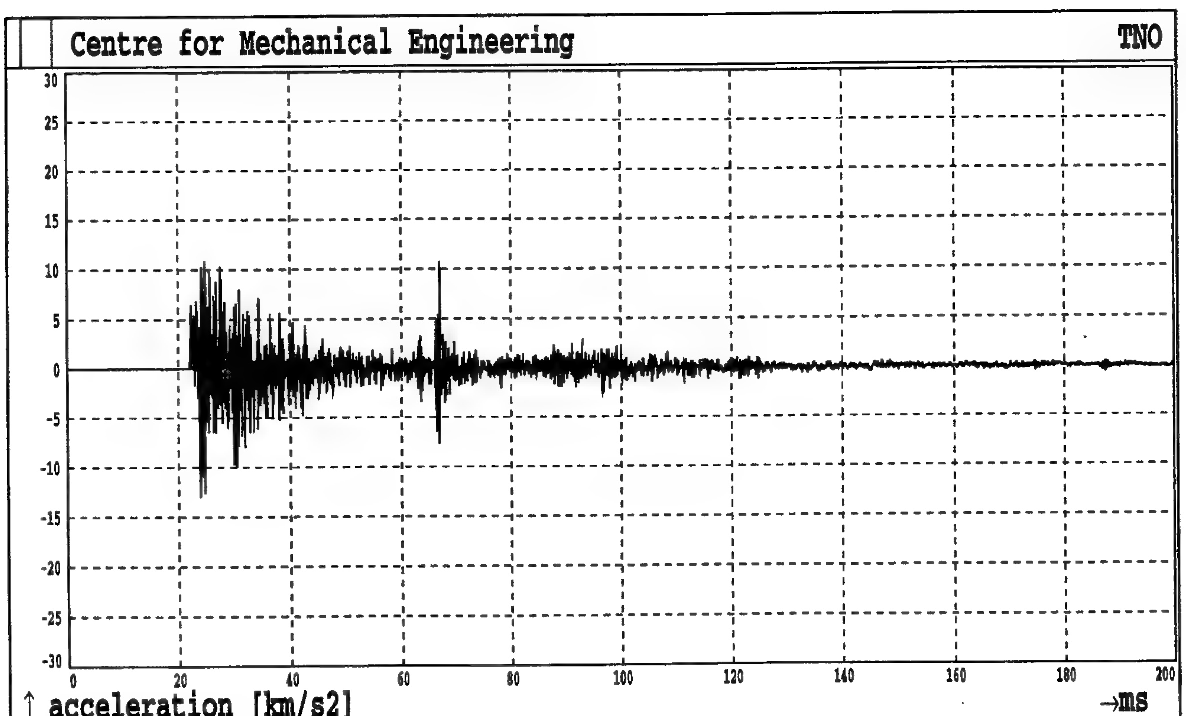


Fig.1B10. Shot 1 Sensor A2

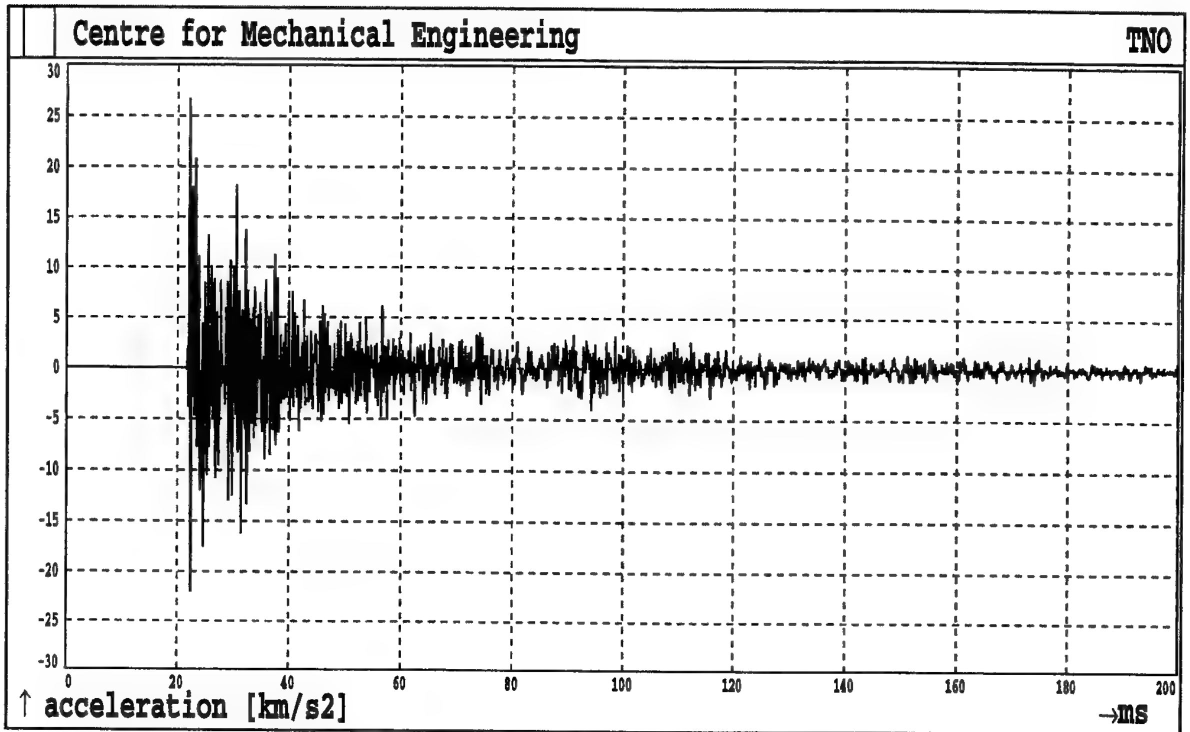


Fig.1B11. Shot 1 Sensor A3

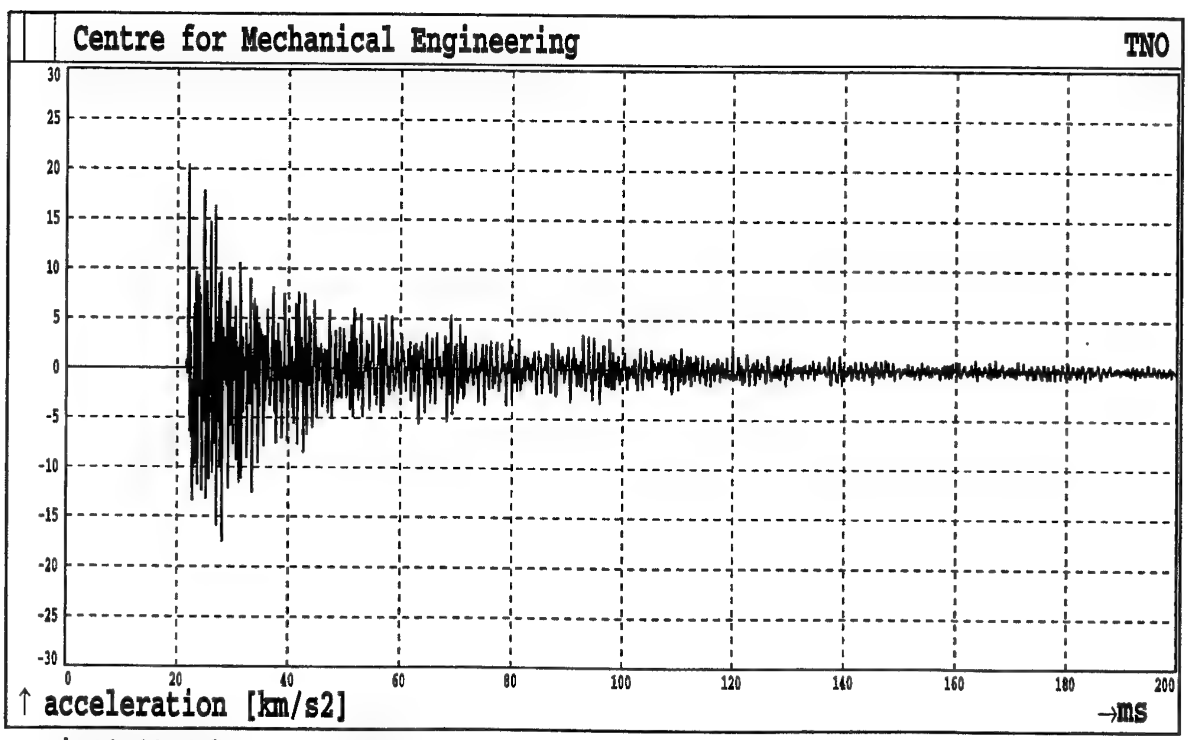


Fig.1B12. Shot 1 Sensor A4

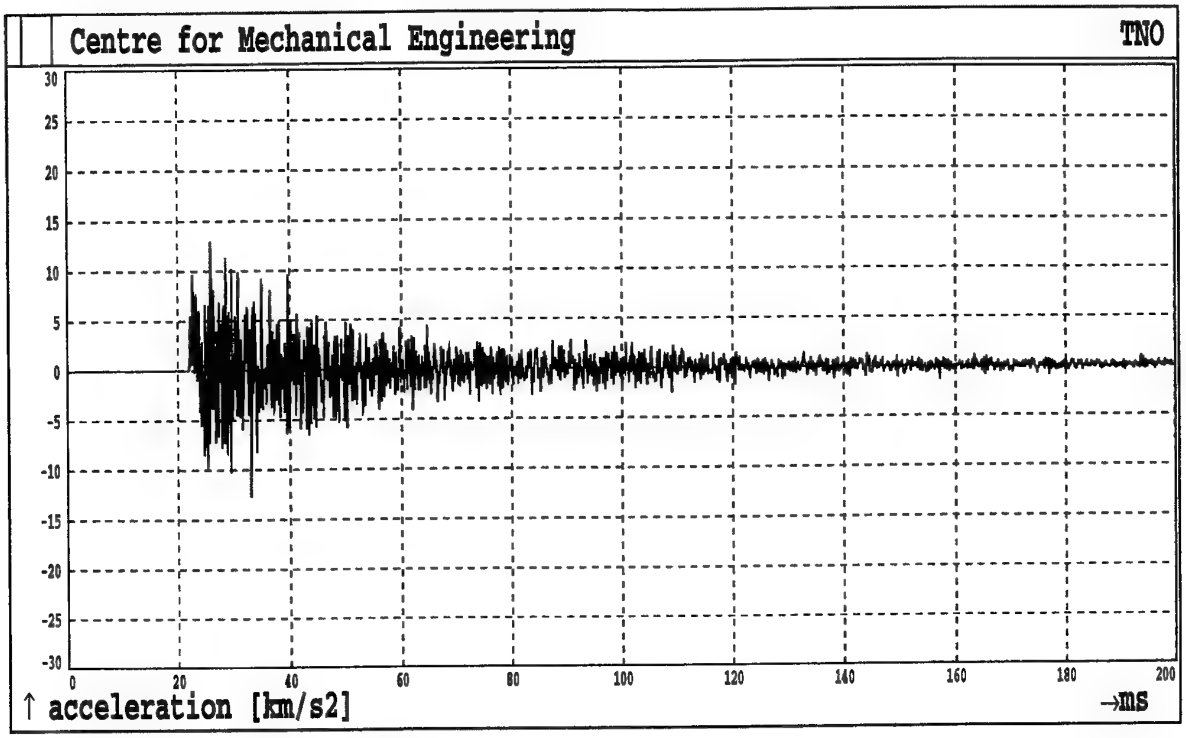


Fig.1B13. Shot 1 Sensor A5

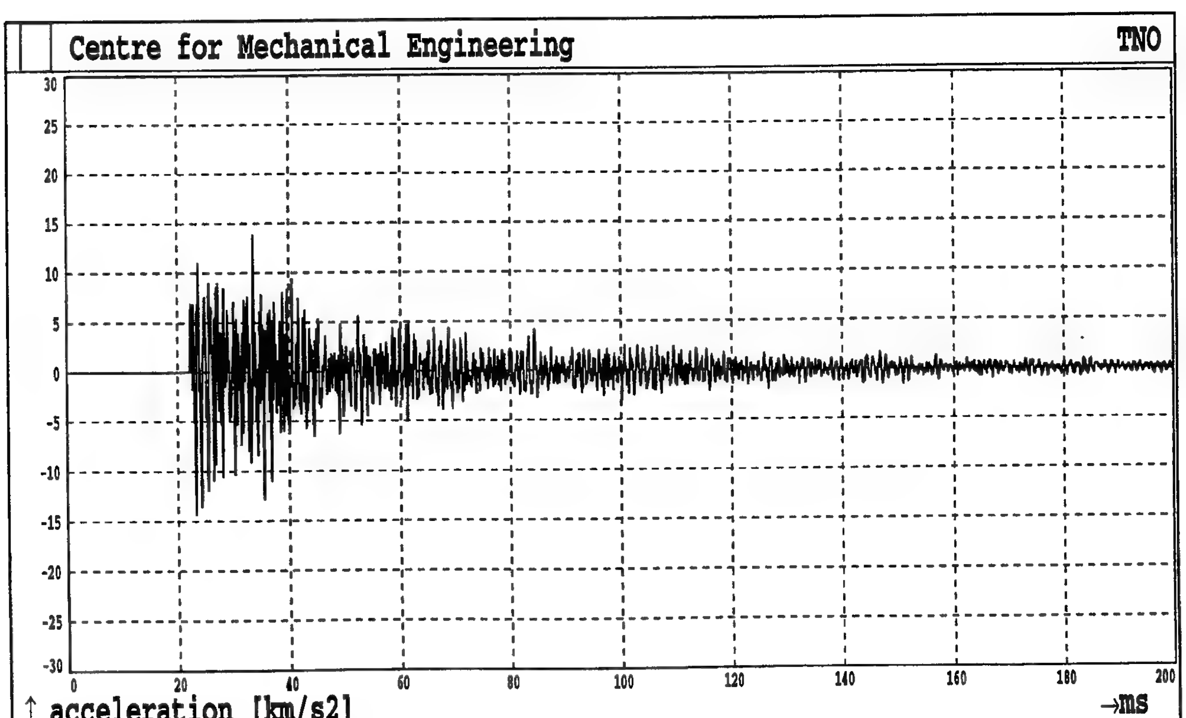


Fig.1B14. Shot 1 Sensor A6

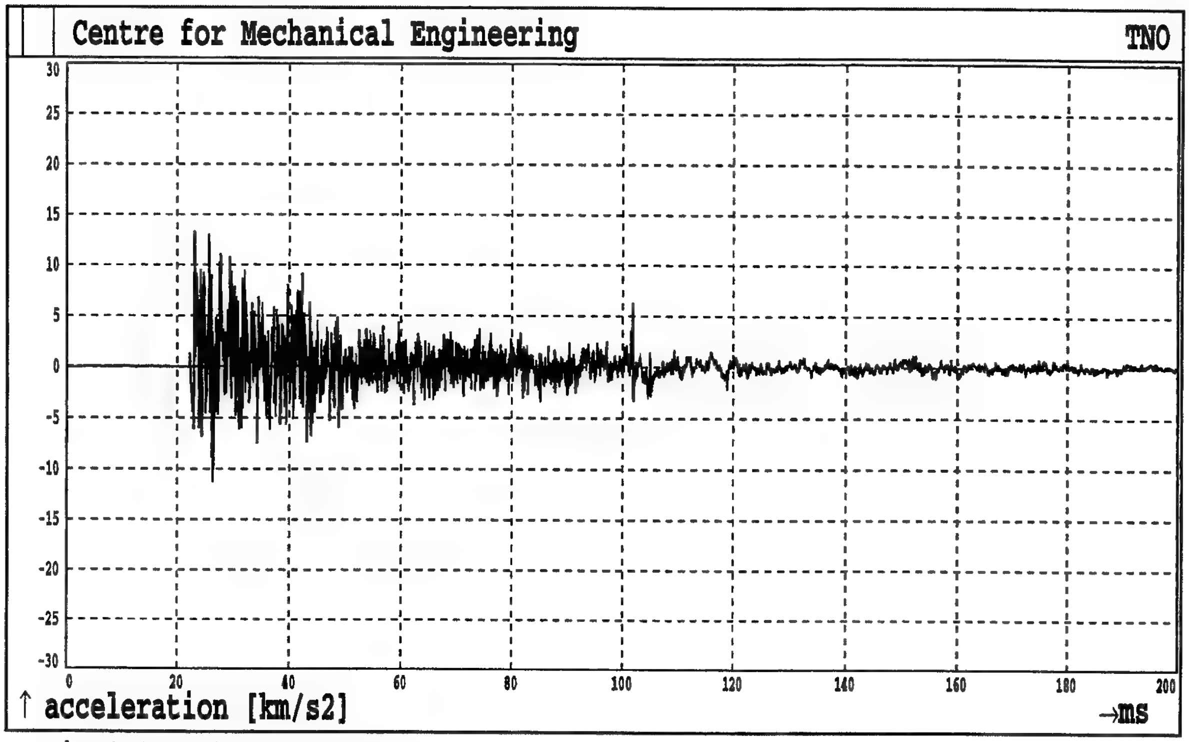


Fig.1B15. Shot 1 Sensor A7

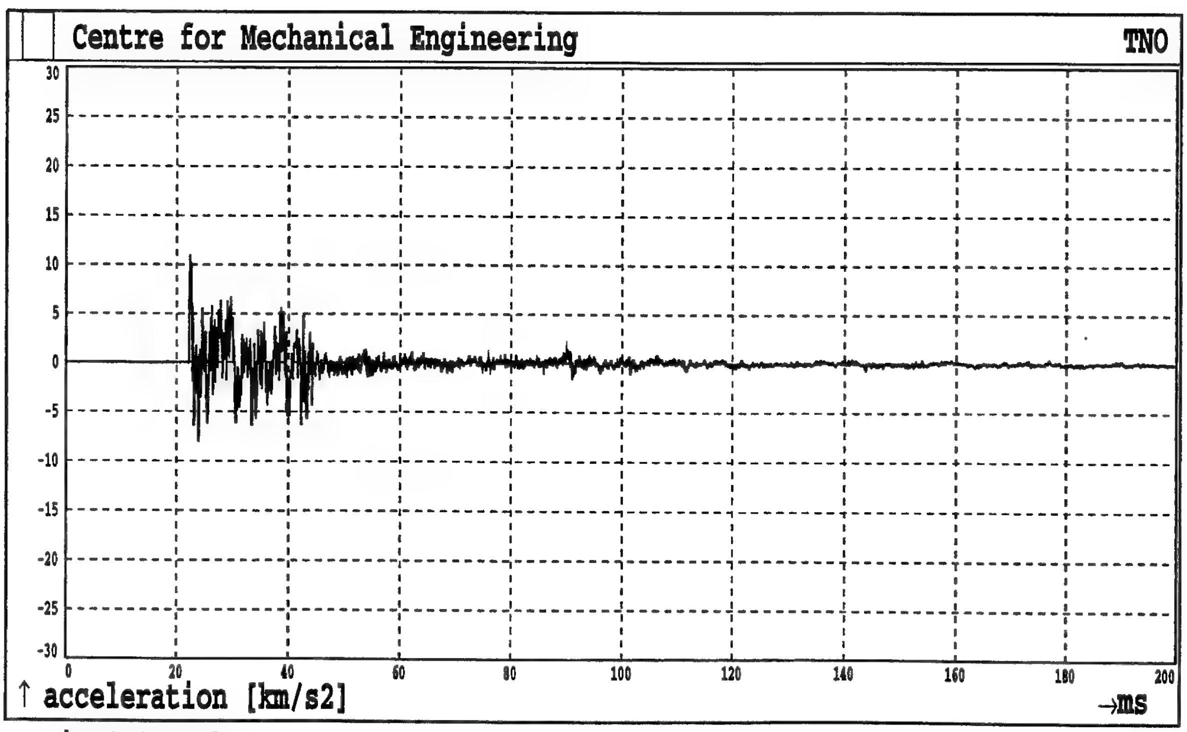


Fig.1B16. Shot 1 Sensor A8

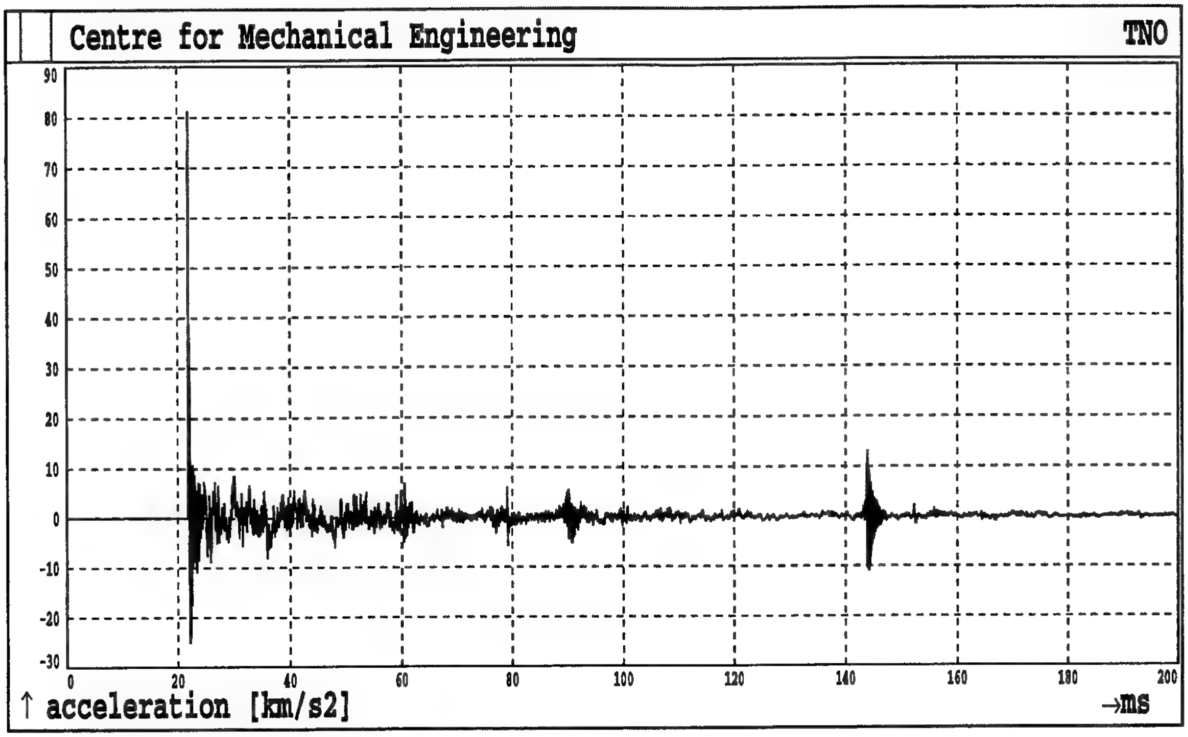


Fig.1B17. Shot 1 Sensor A9

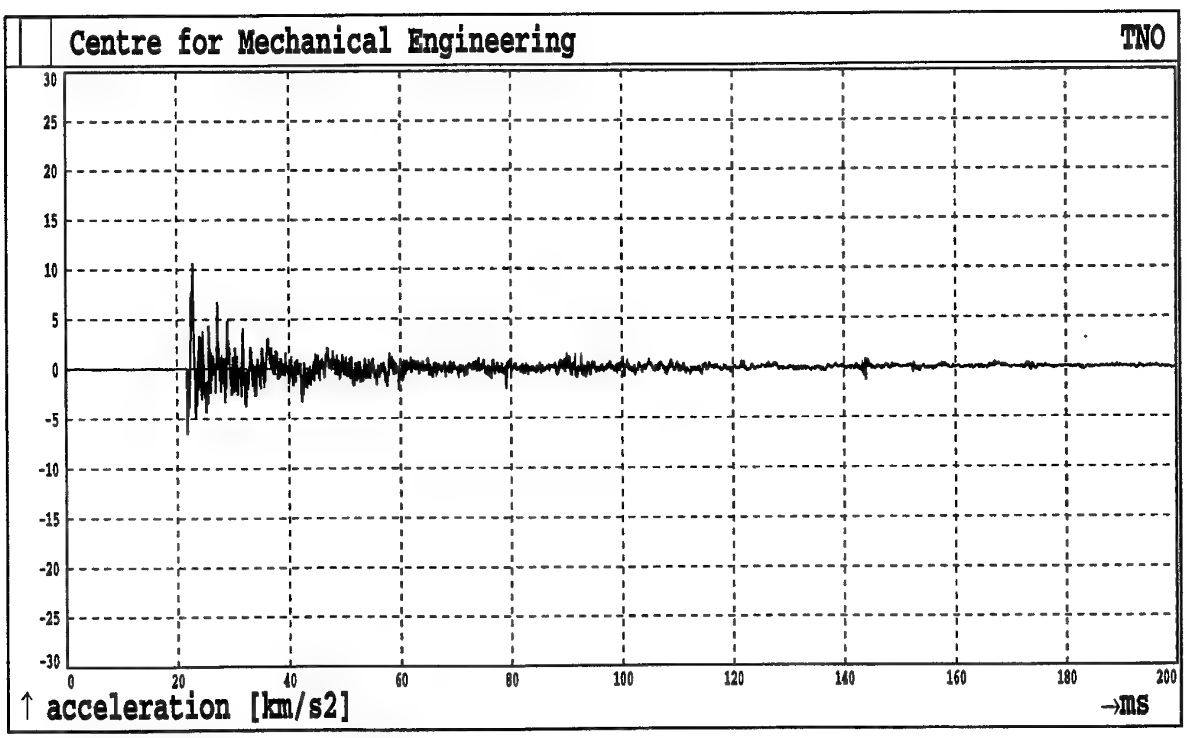


Fig.1B18. Shot 1 Sensor A10

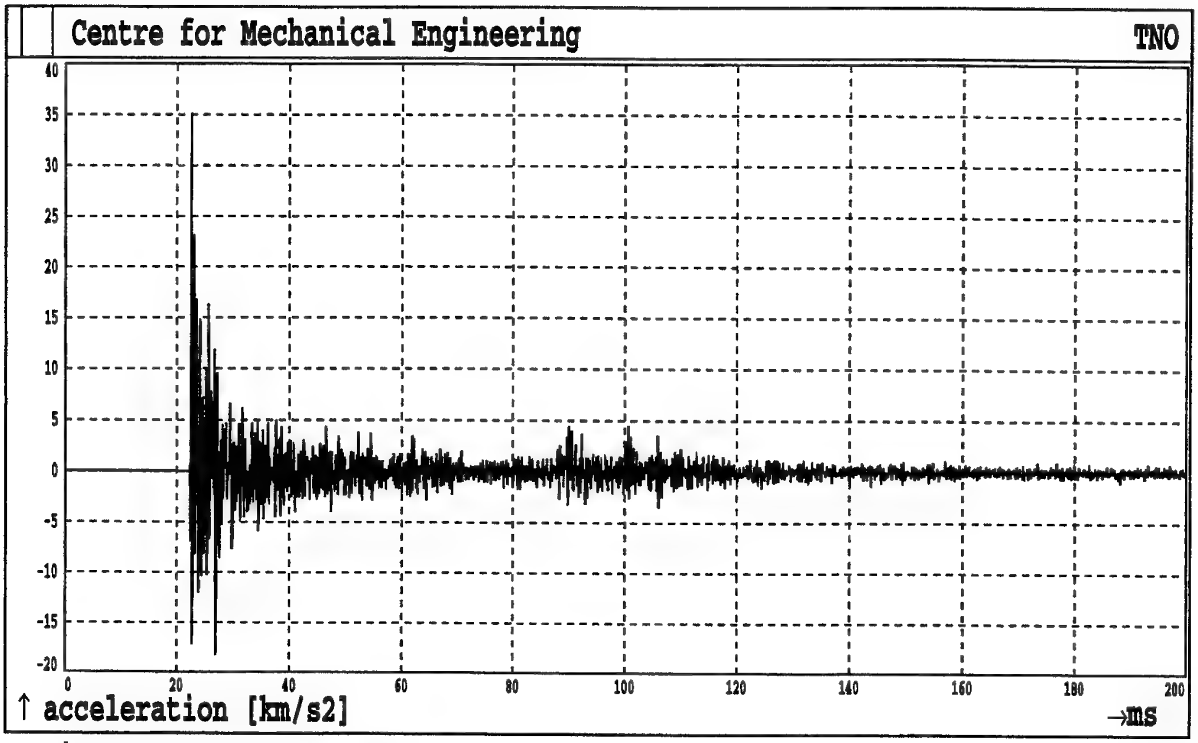


Fig.1B19. Shot 1 Sensor A11

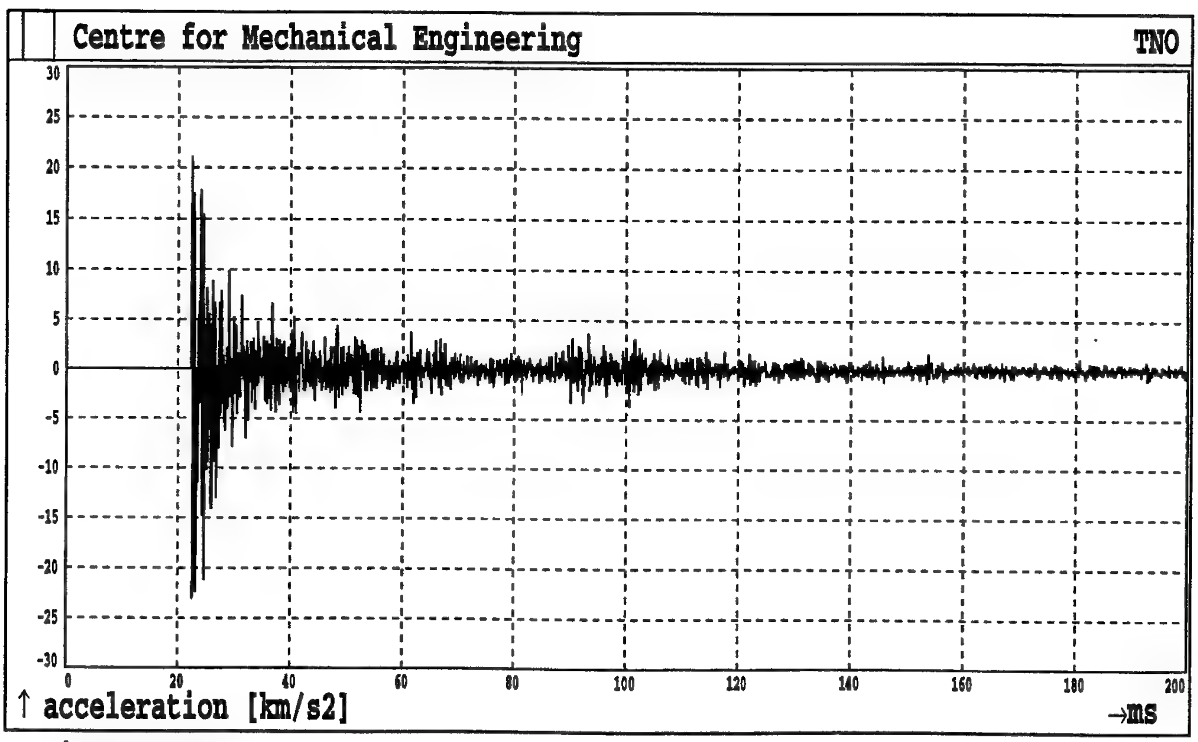


Fig.1B20. Shot 1 Sensor A12

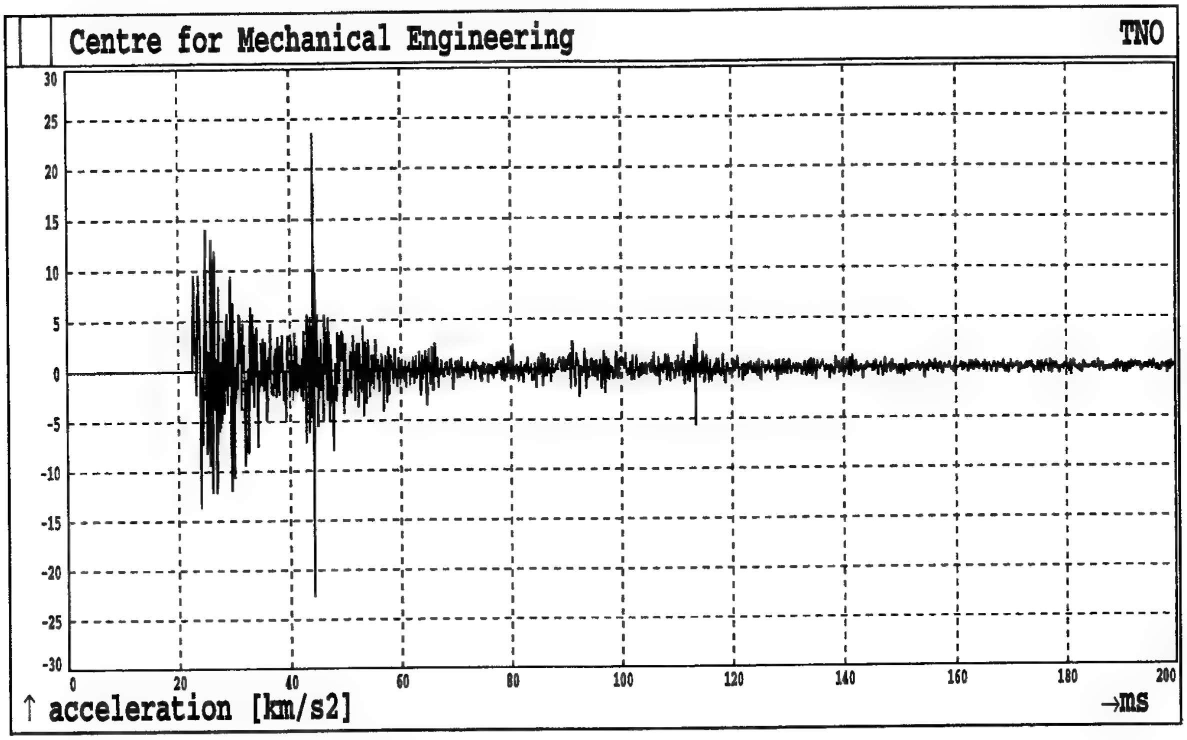


Fig.1B21. Shot 1 Sensor A13

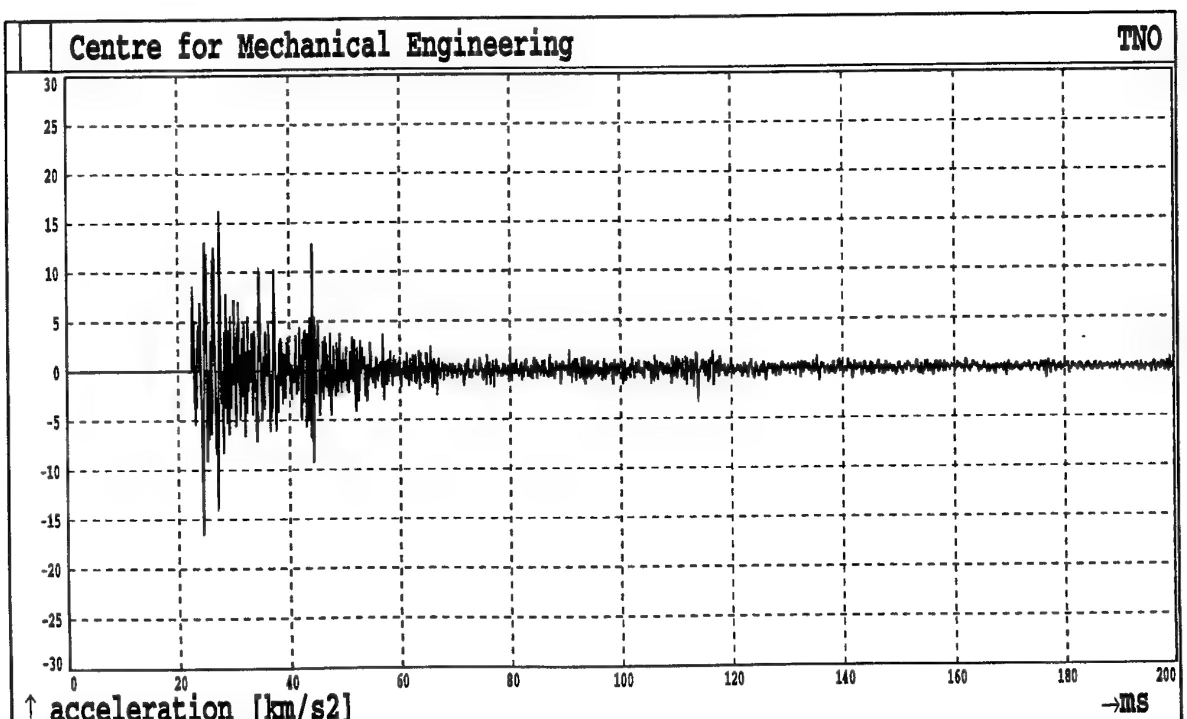


Fig.1B22. Shot 1 Sensor A14

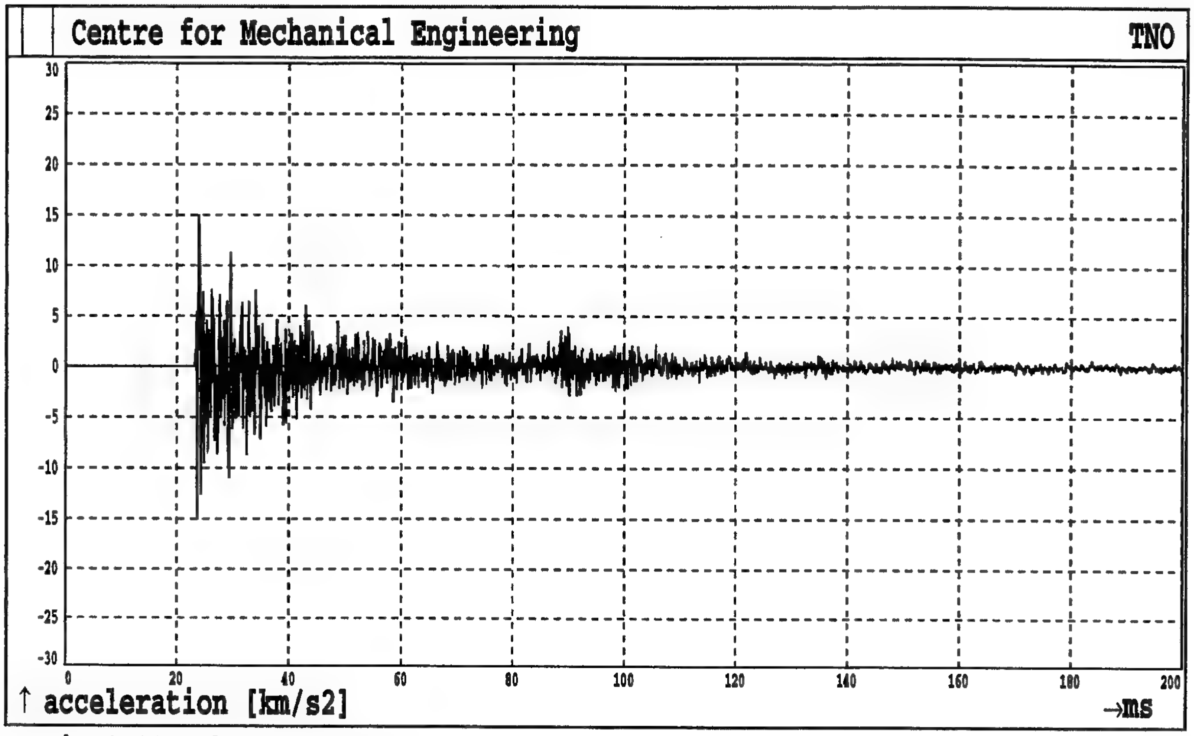


Fig.1B23. Shot 1 Sensor A15

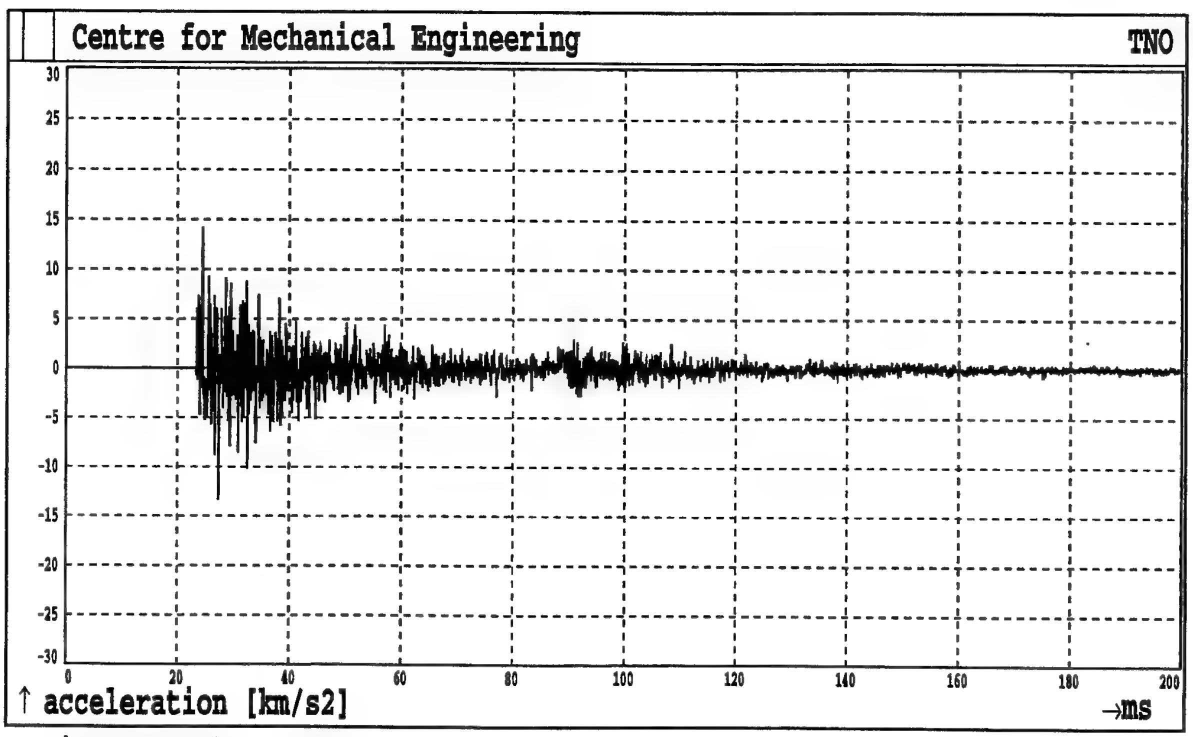


Fig.1B24. Shot 1 Sensor A16

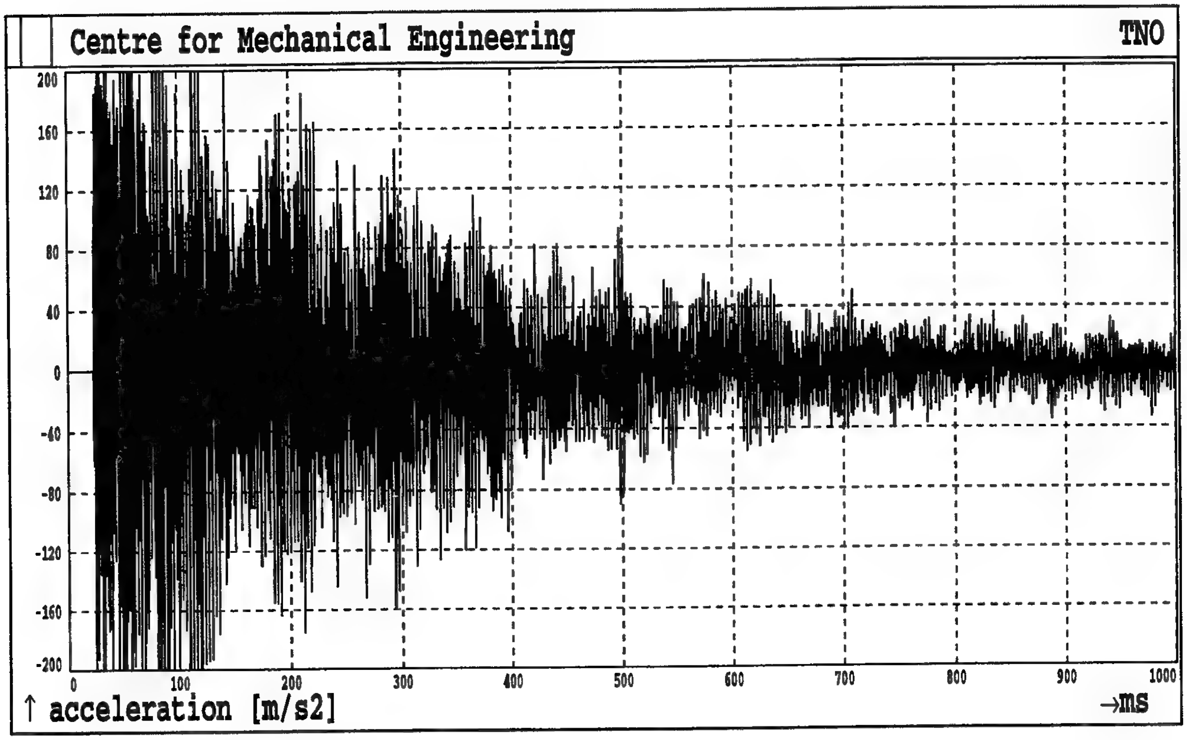


Fig.1B25 Shot 1 Sensor A17

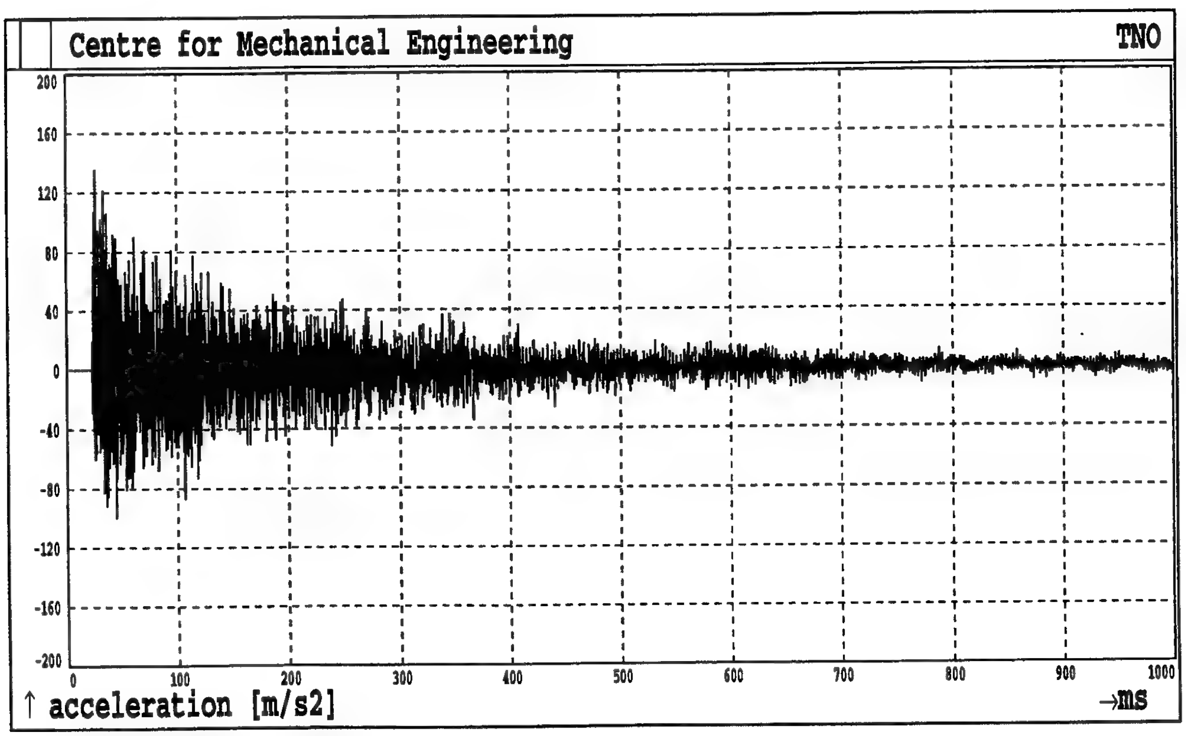


Fig.1B26 Shot 1 Sensor A18

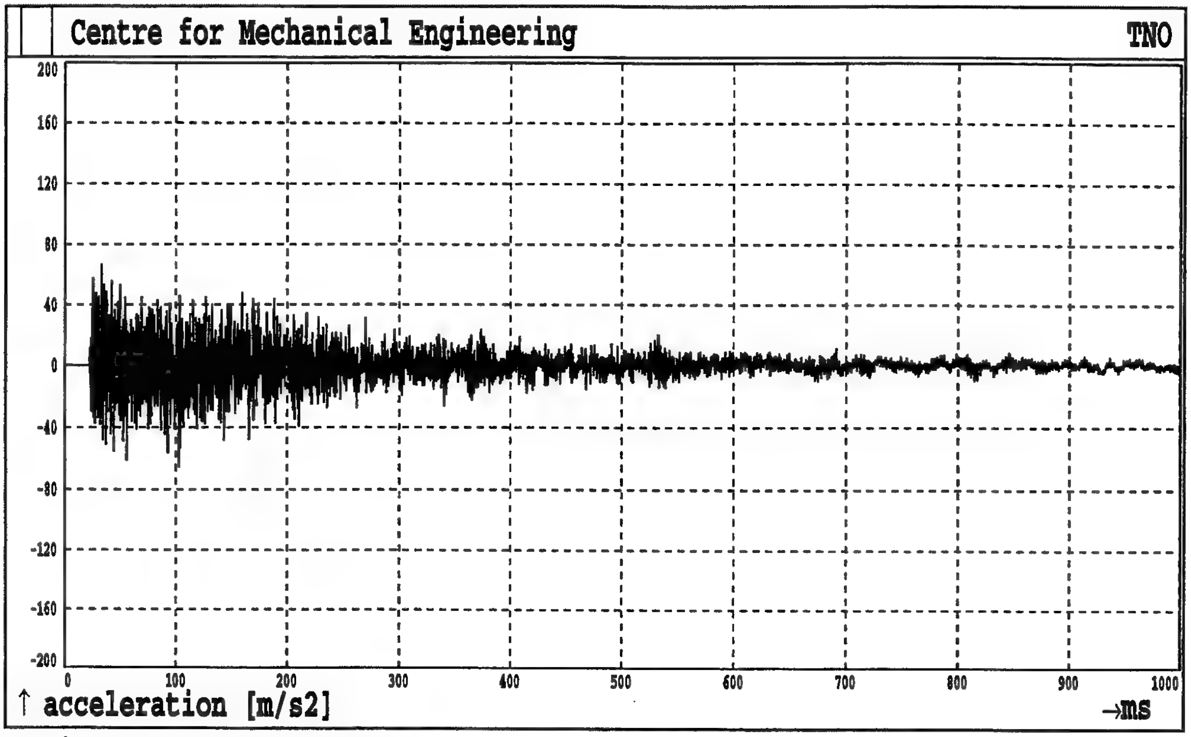


Fig.1B27. Shot 1 Sensor A19

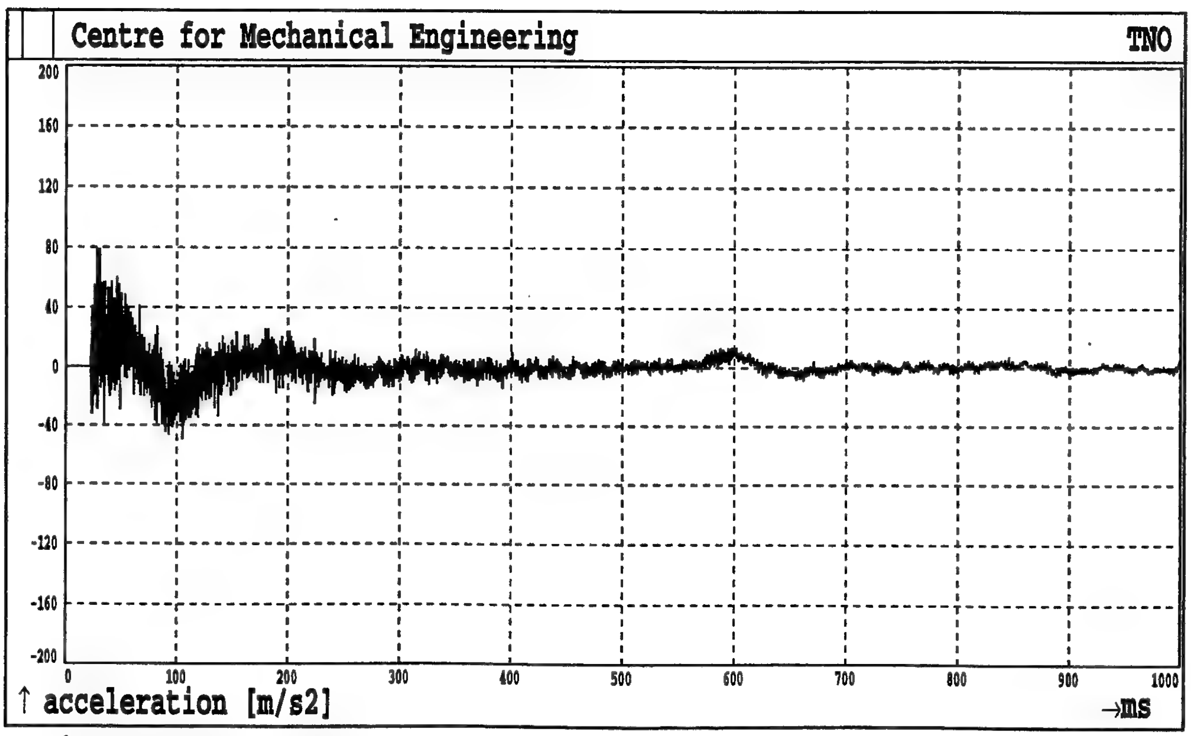


Fig.1B28. Shot 1 Sensor A20

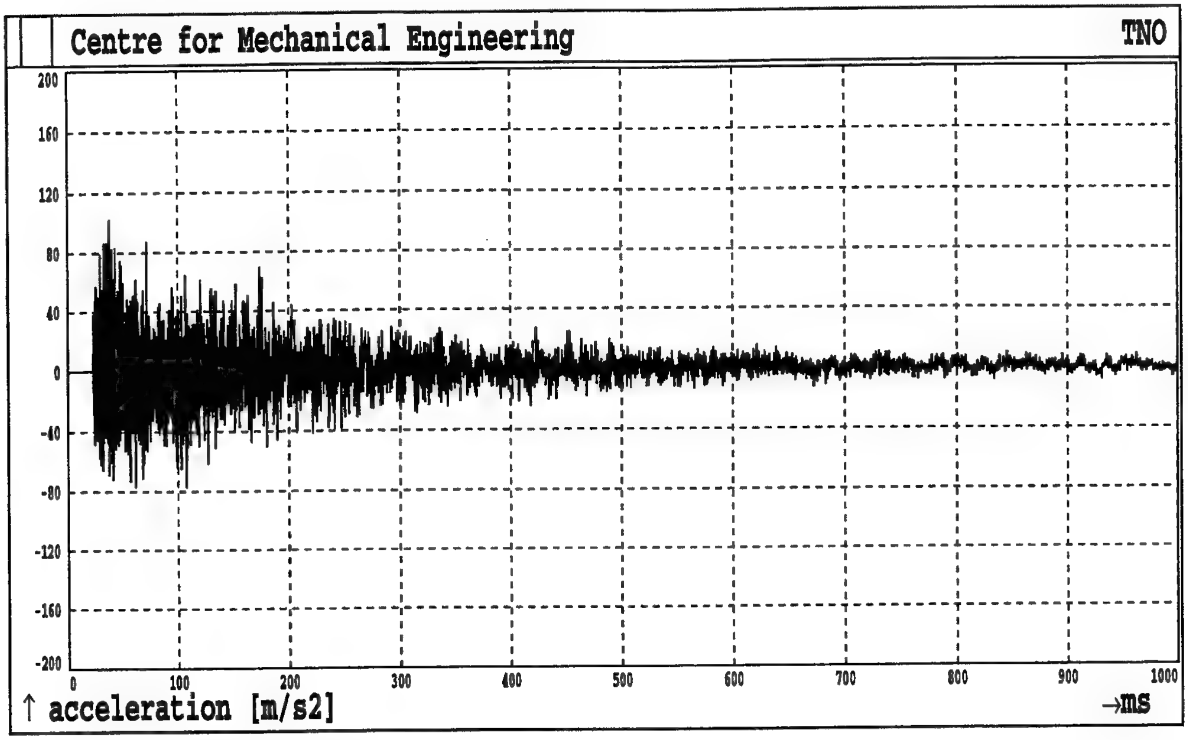


Fig.1B29 Shot 1 Sensor A21

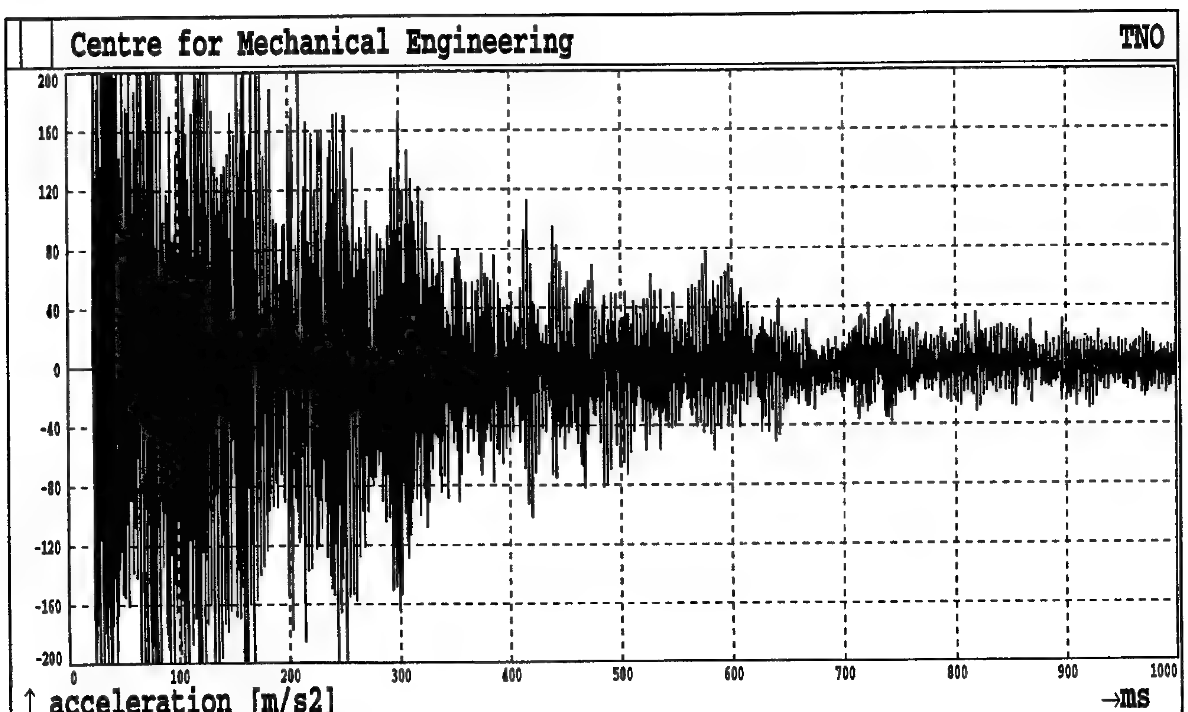


Fig.1B30 Shot 1 Sensor A22

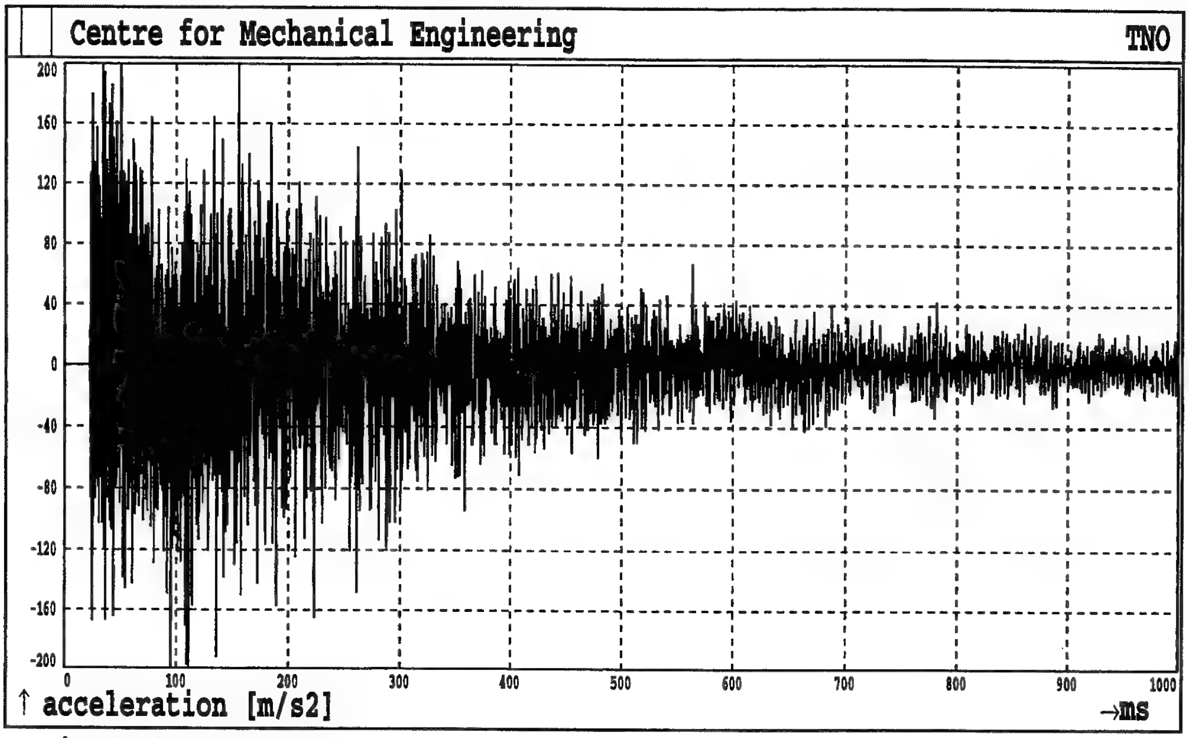


Fig.1B31 Shot 1 Sensor A23

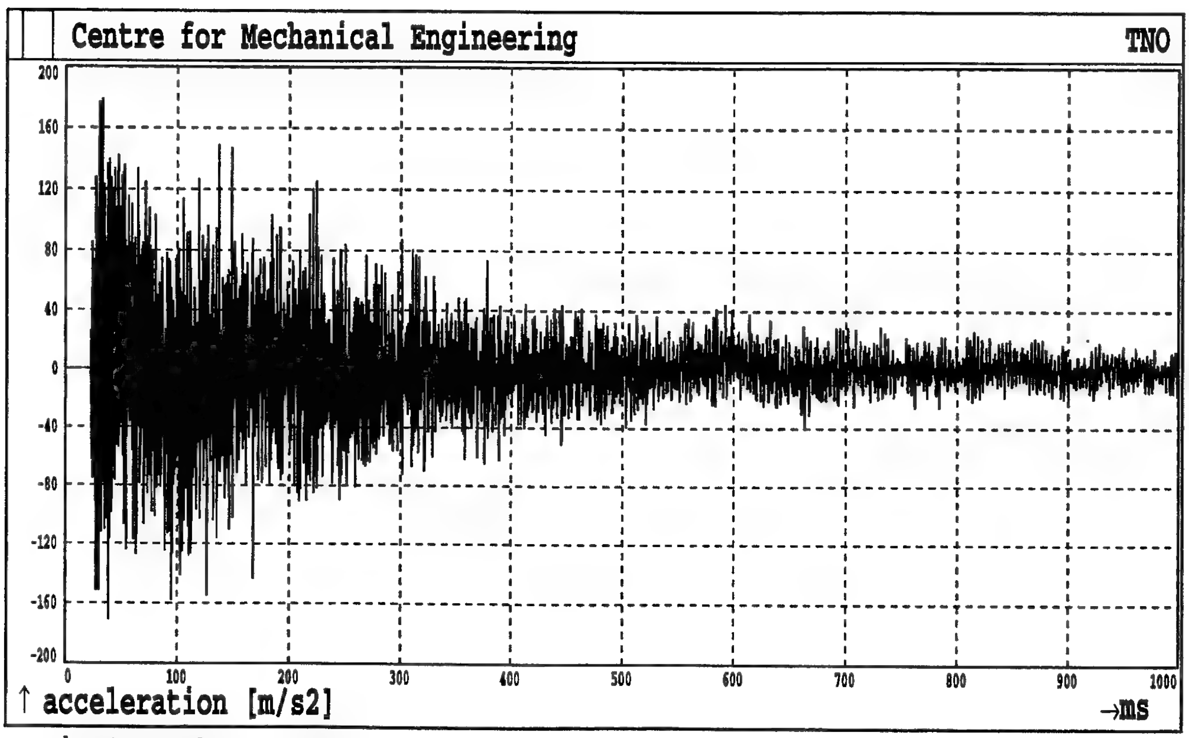


Fig.1B32 Shot 1 Sensor A24

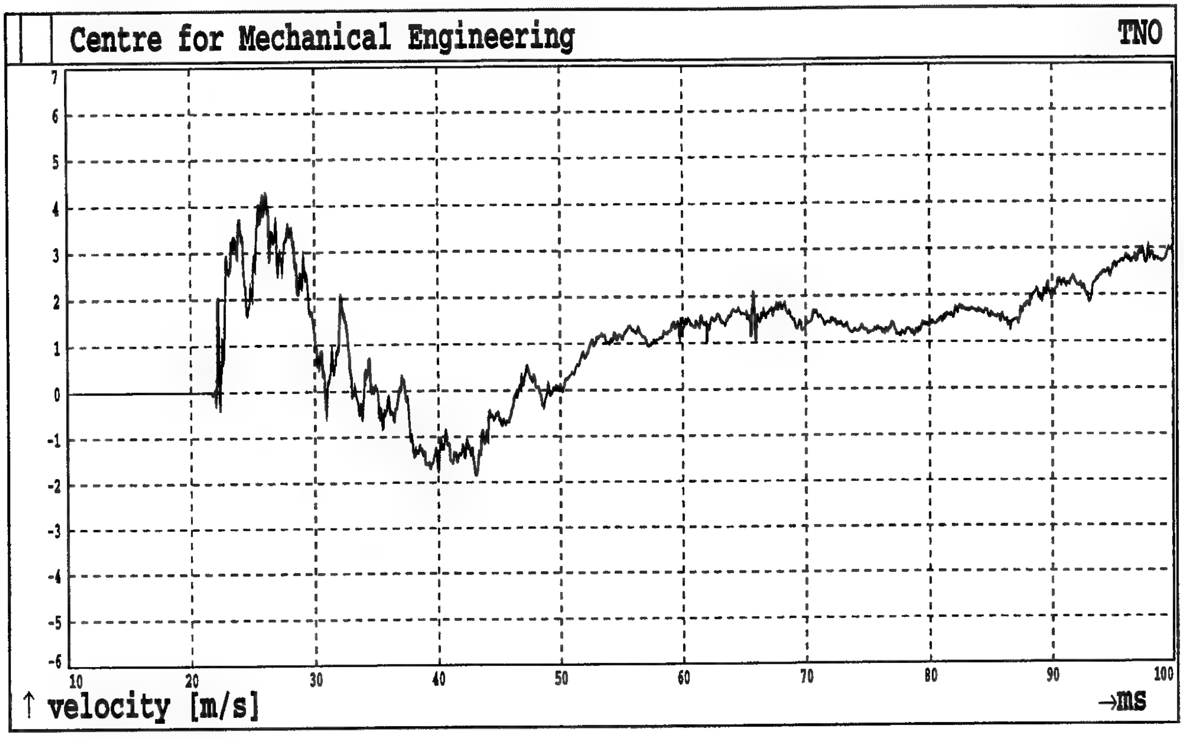


Fig.1B33. Shot 1 Sensor A1

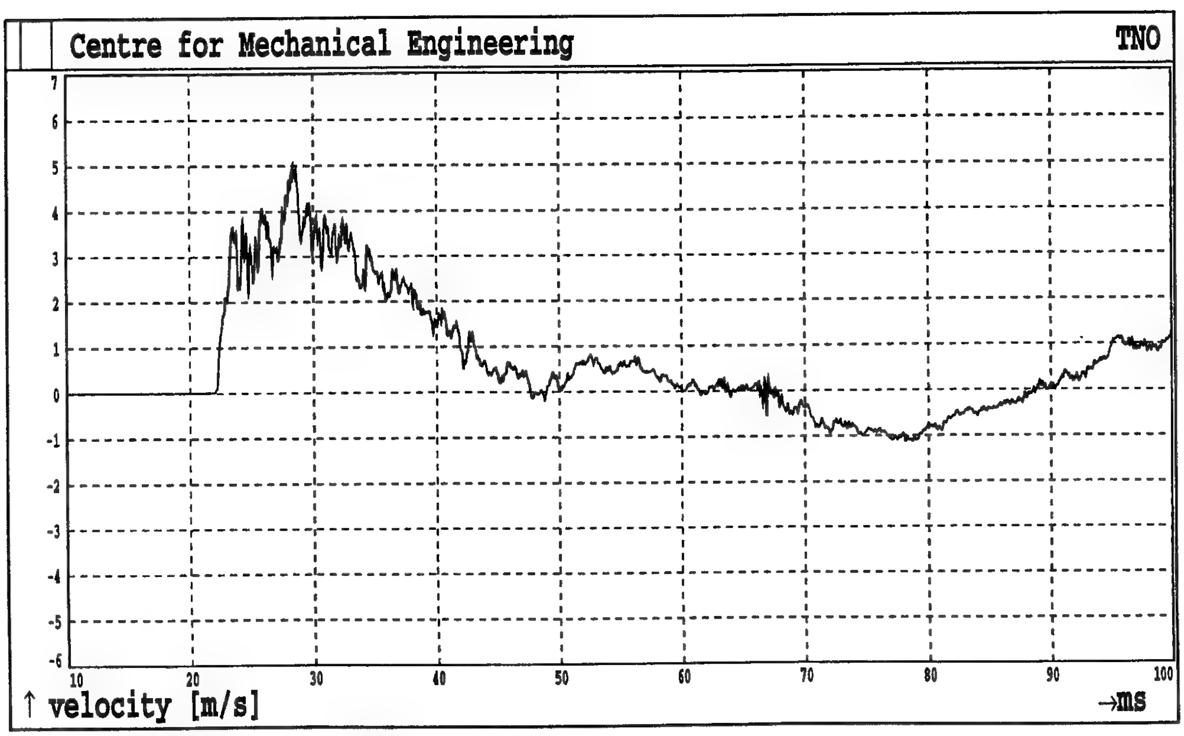


Fig.1B34. Shot 1 Sensor A2

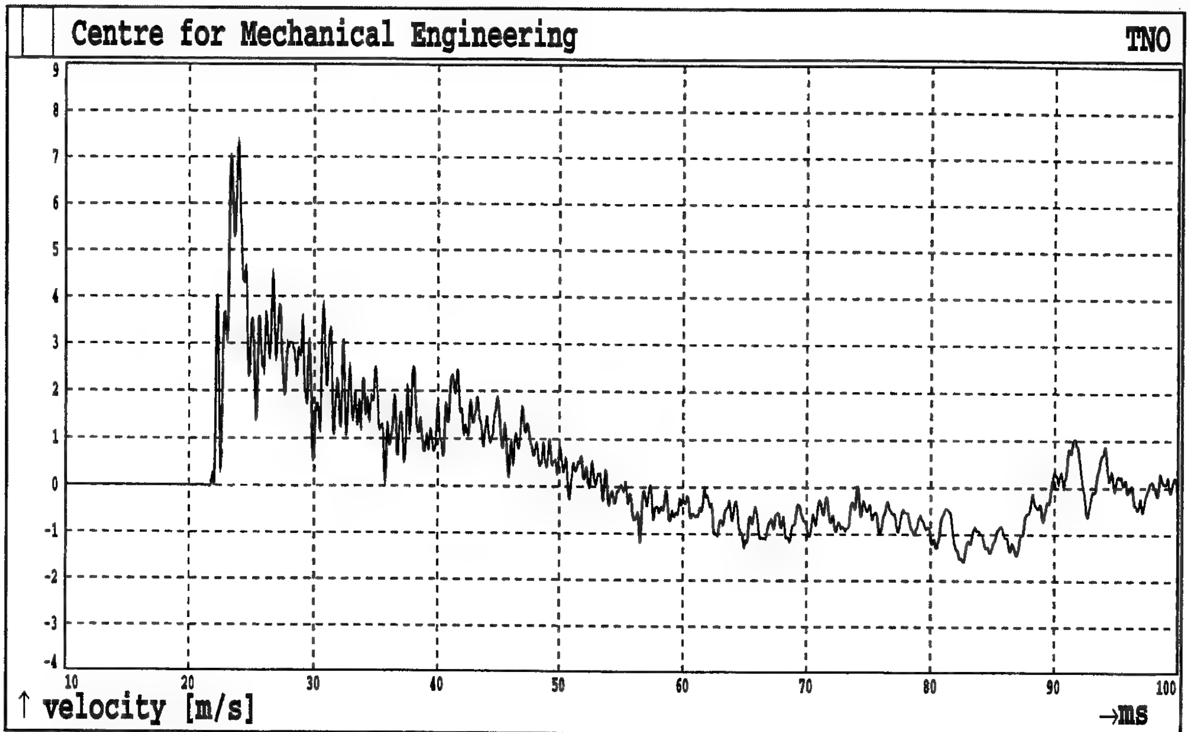


Fig.1B35. Shot 1 Sensor A3

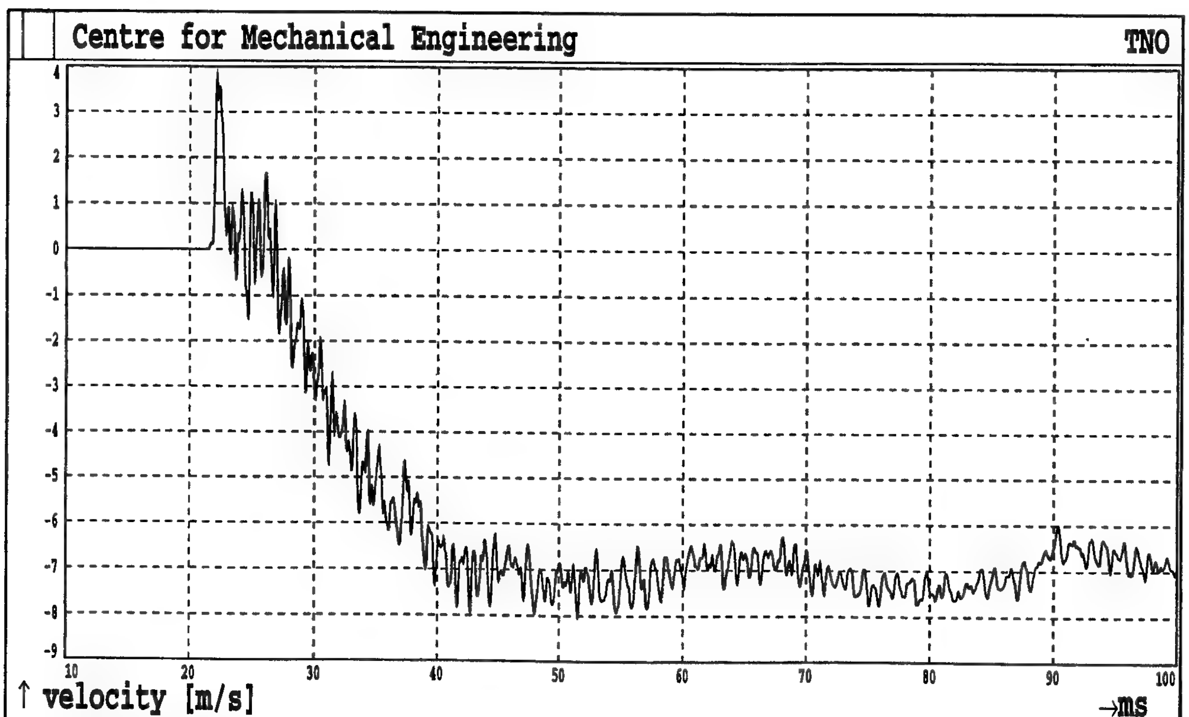


Fig.1B36. Shot 1 Sensor A4

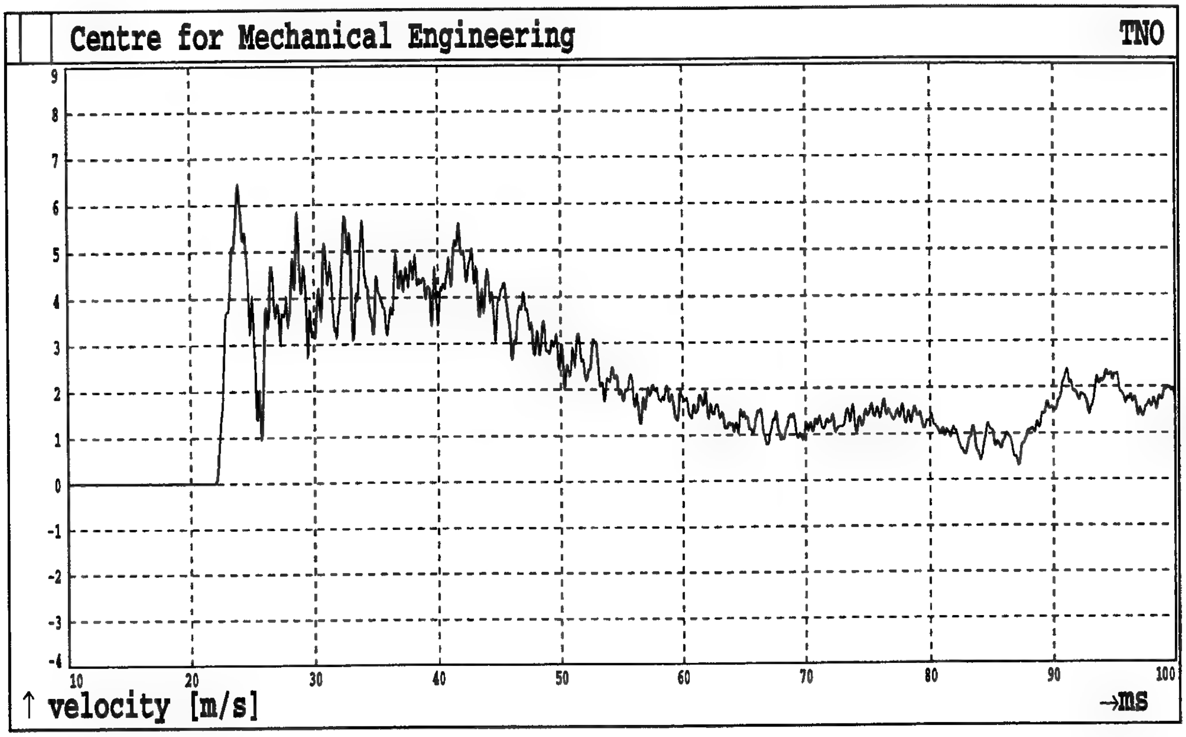


Fig.1B37. Shot 1 Sensor A5

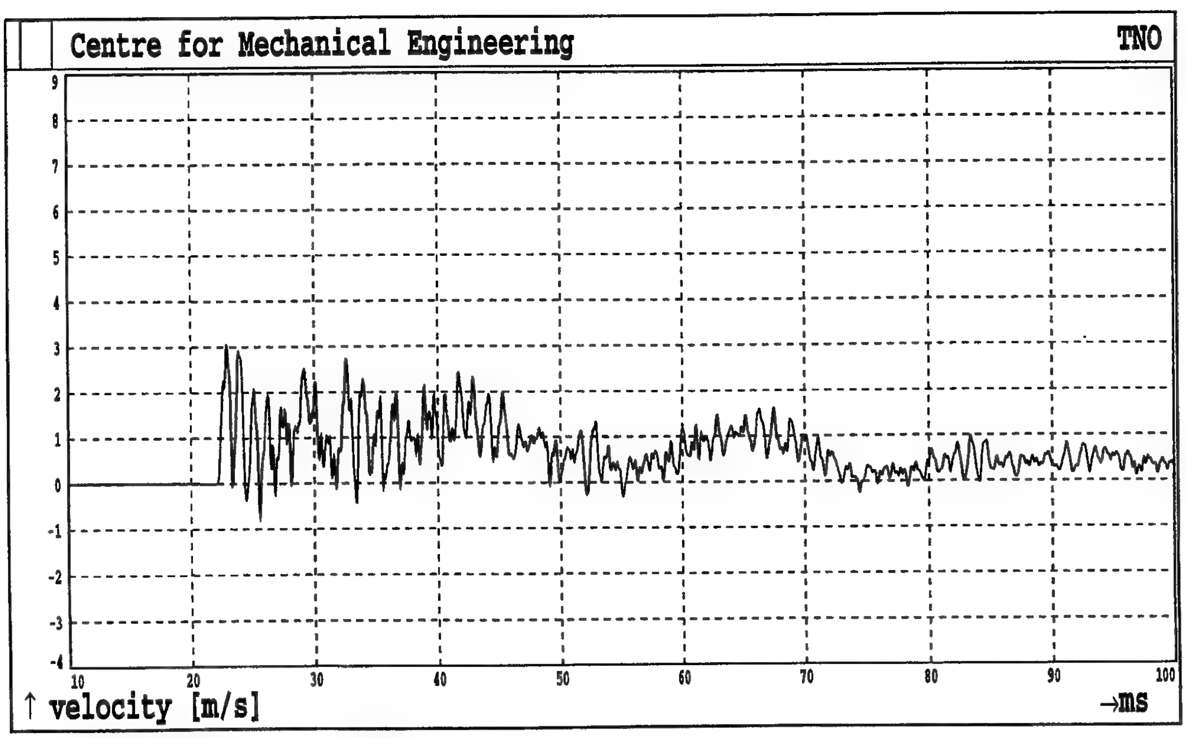


Fig.1B38. Shot 1 Sensor A6

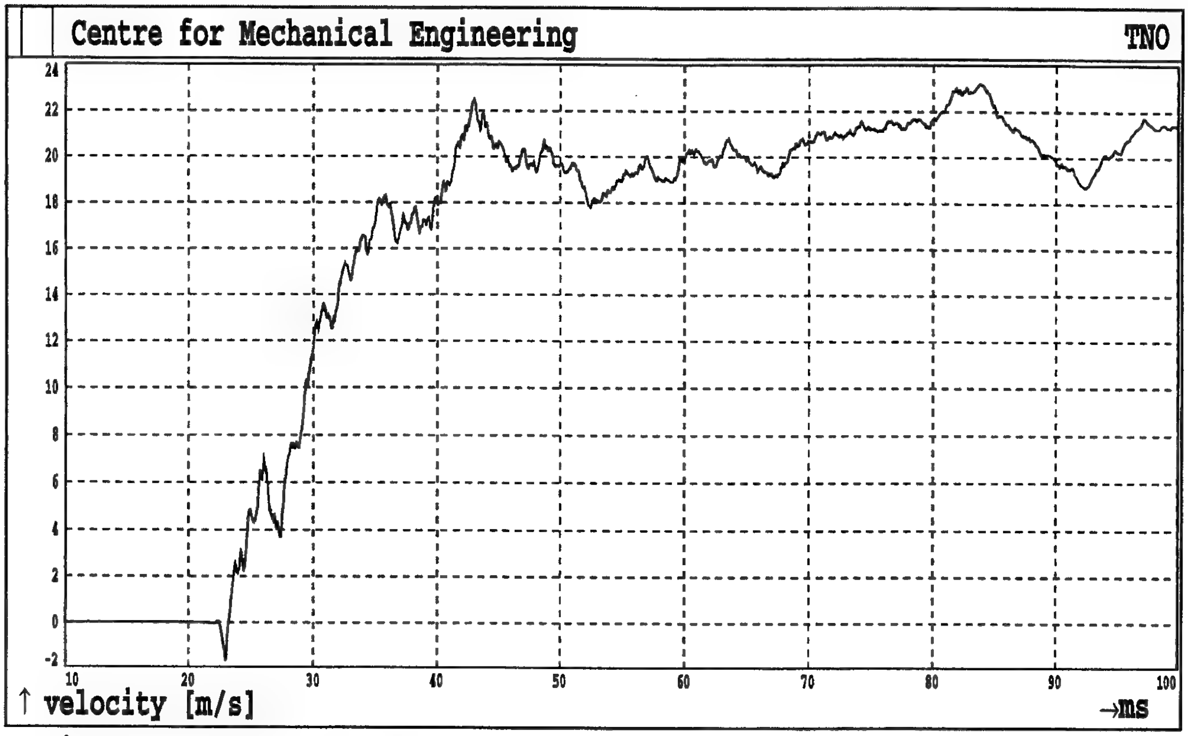


Fig.1B39. Shot 1 Sensor A7

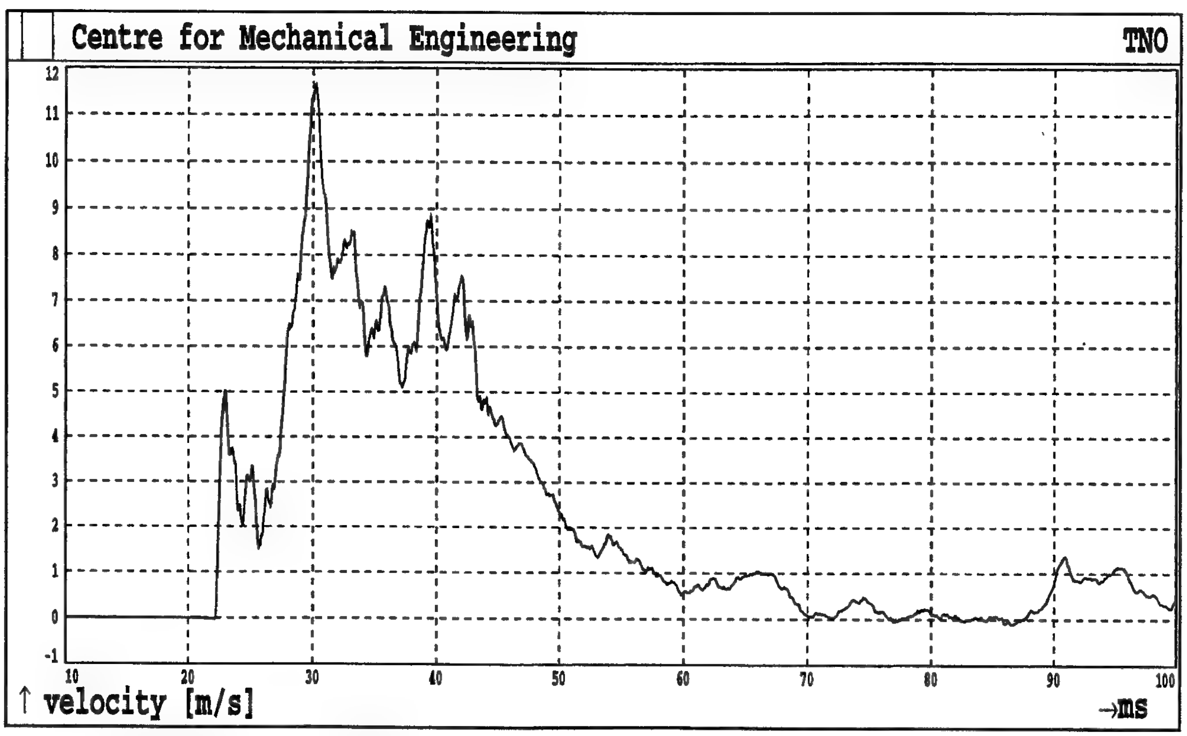


Fig.1B40. Shot 1 Sensor A8

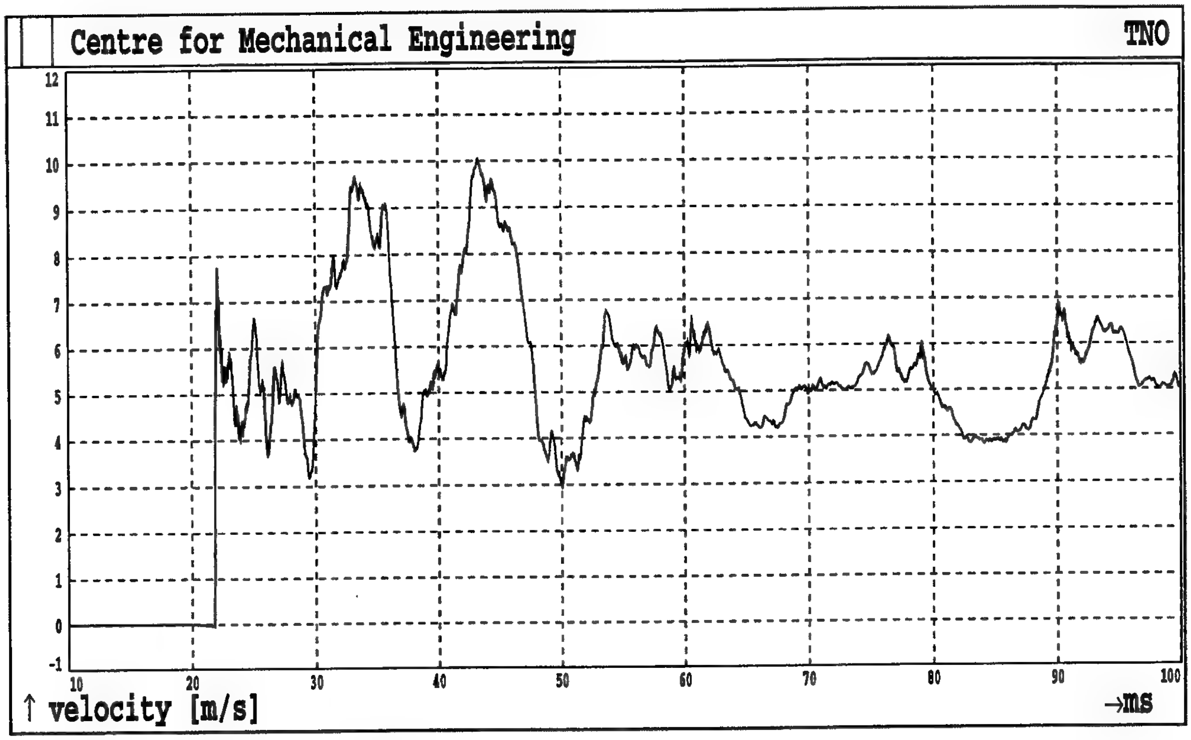


Fig.1B41. Shot 1 Sensor A9

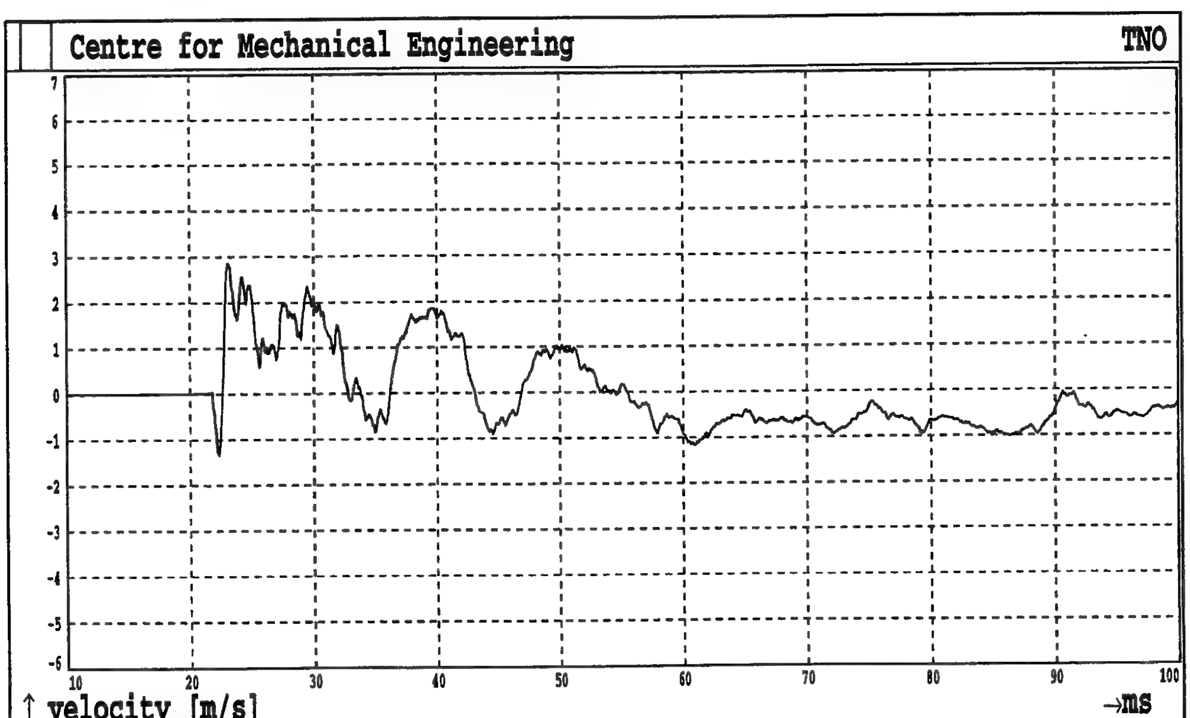


Fig.1B42. Shot 1 Sensor A10

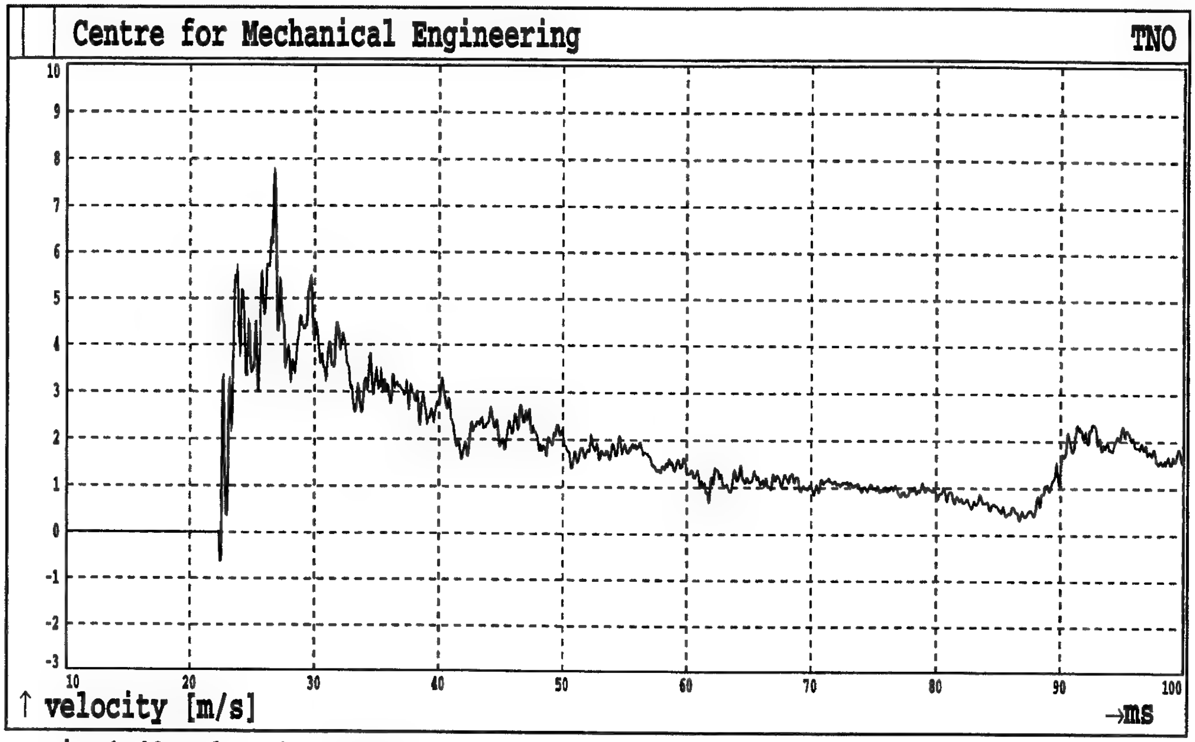


Fig.1B43. Shot 1 Sensor A11

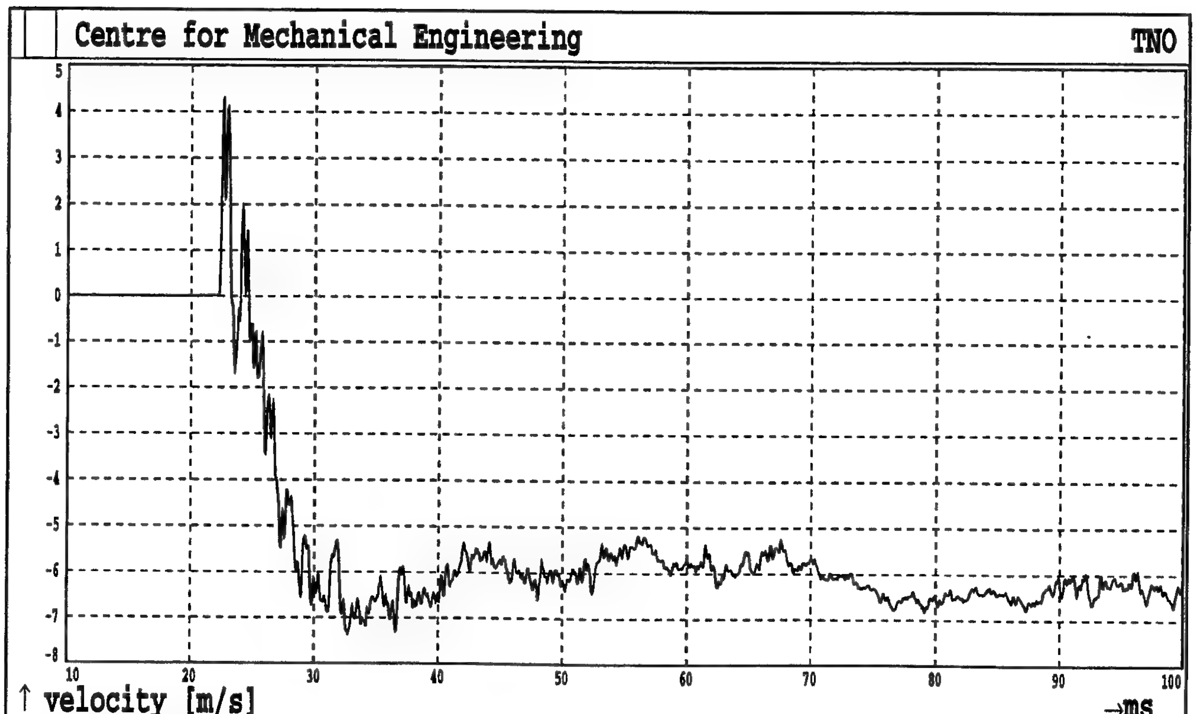


Fig.1B44. Shot 1 Sensor A12

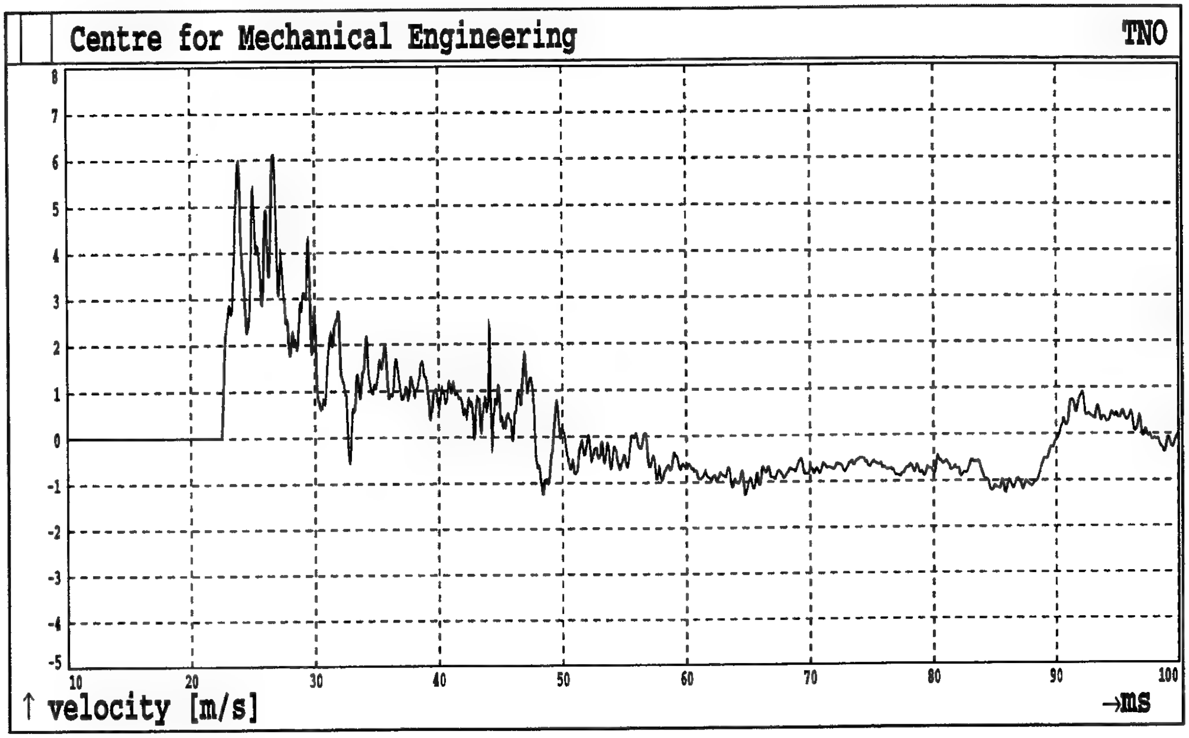


Fig.1B45. Shot 1 Sensor A13

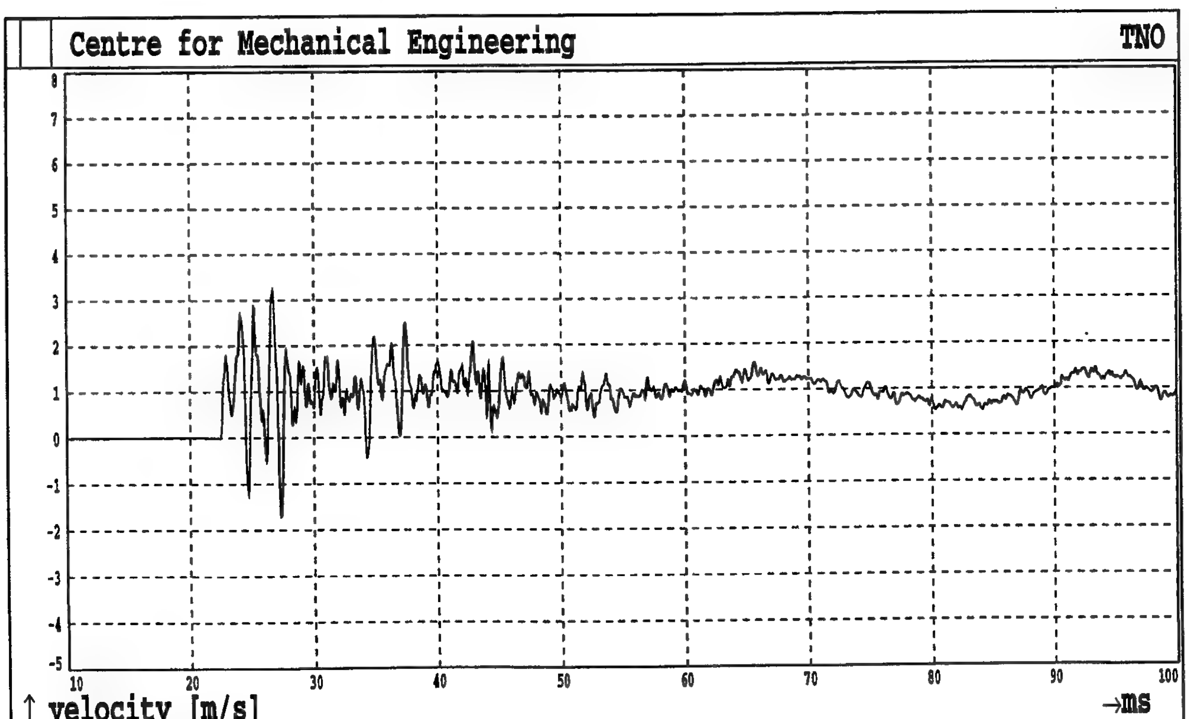


Fig.1B46. Shot 1 Sensor A14

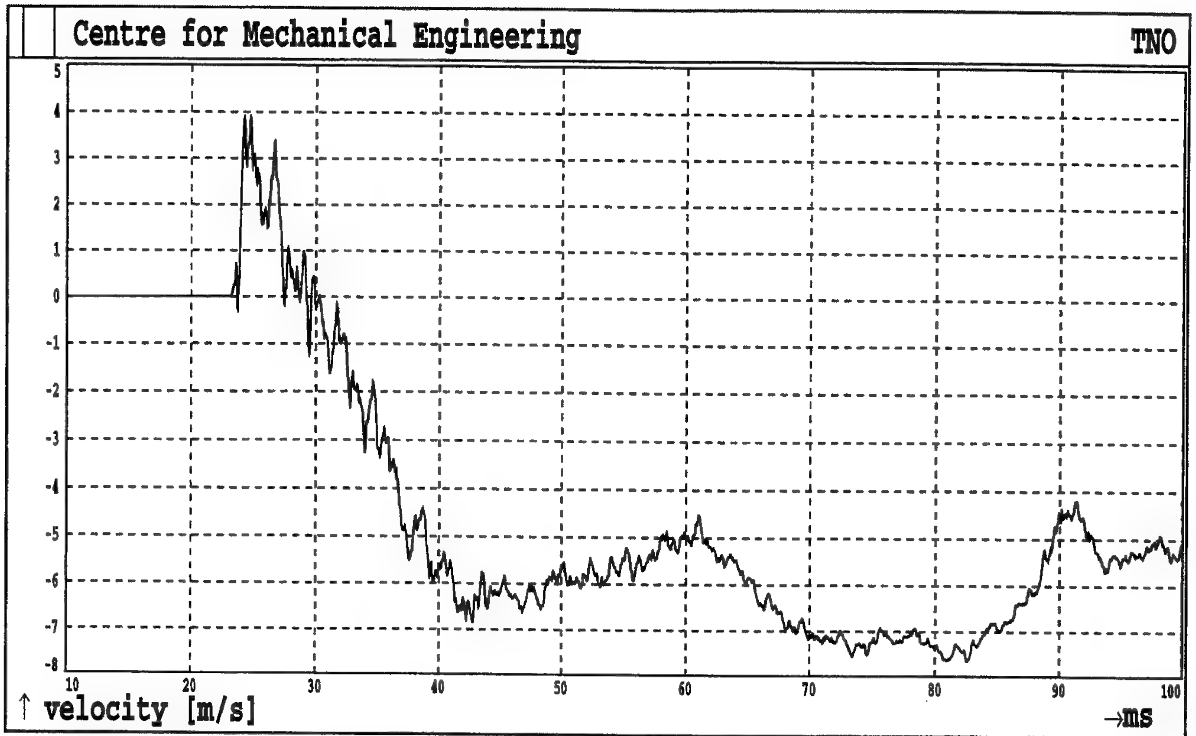


Fig.1B47. Shot 1 Sensor A15

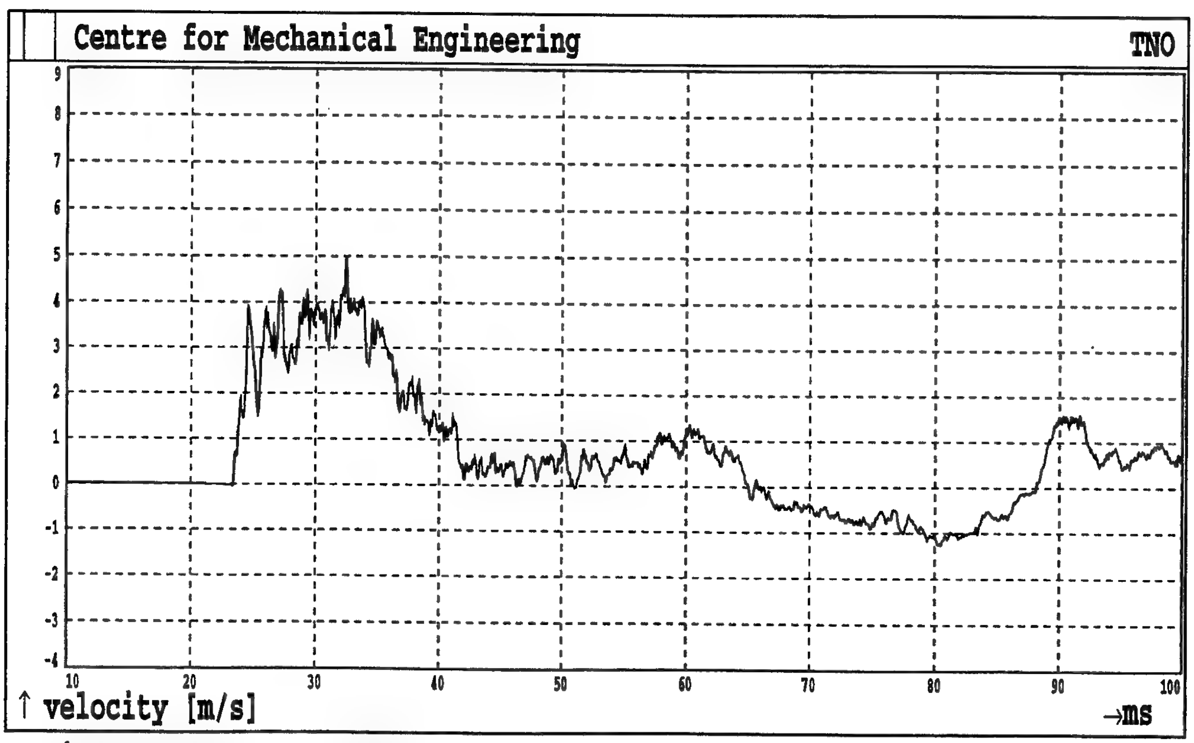


Fig.1B48. Shot 1 Sensor A16

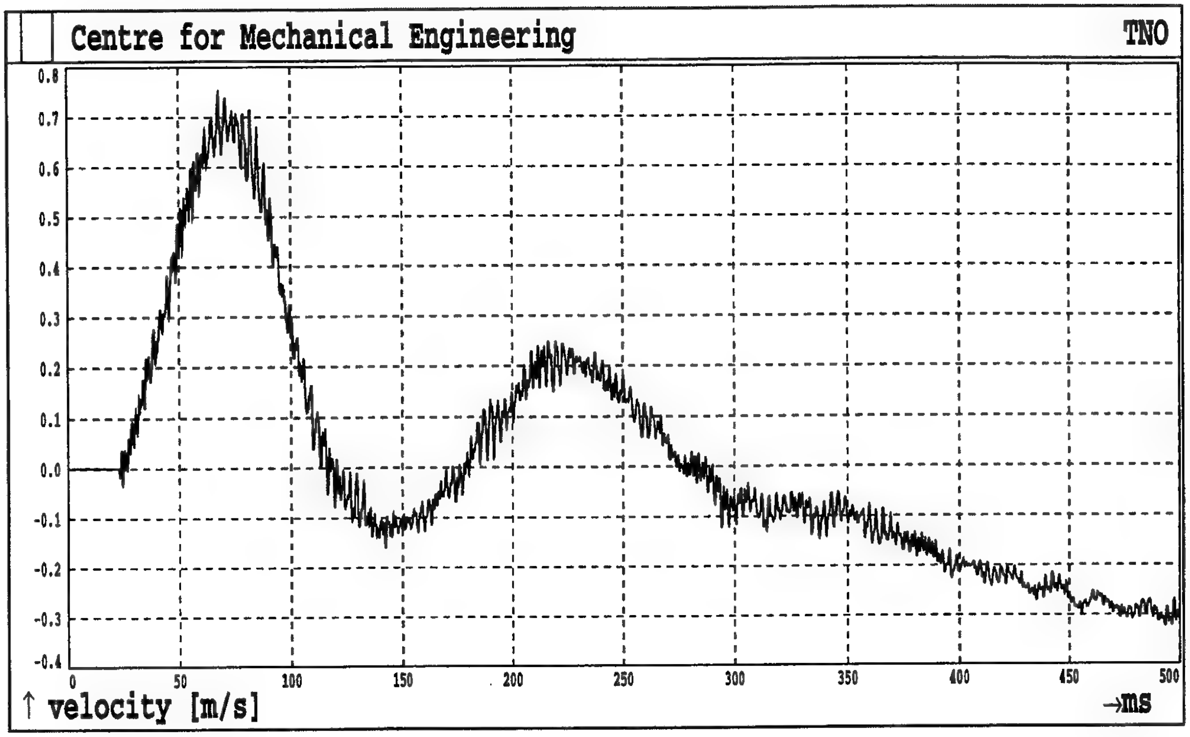


Fig.1B49. Shot 1 Sensor A17

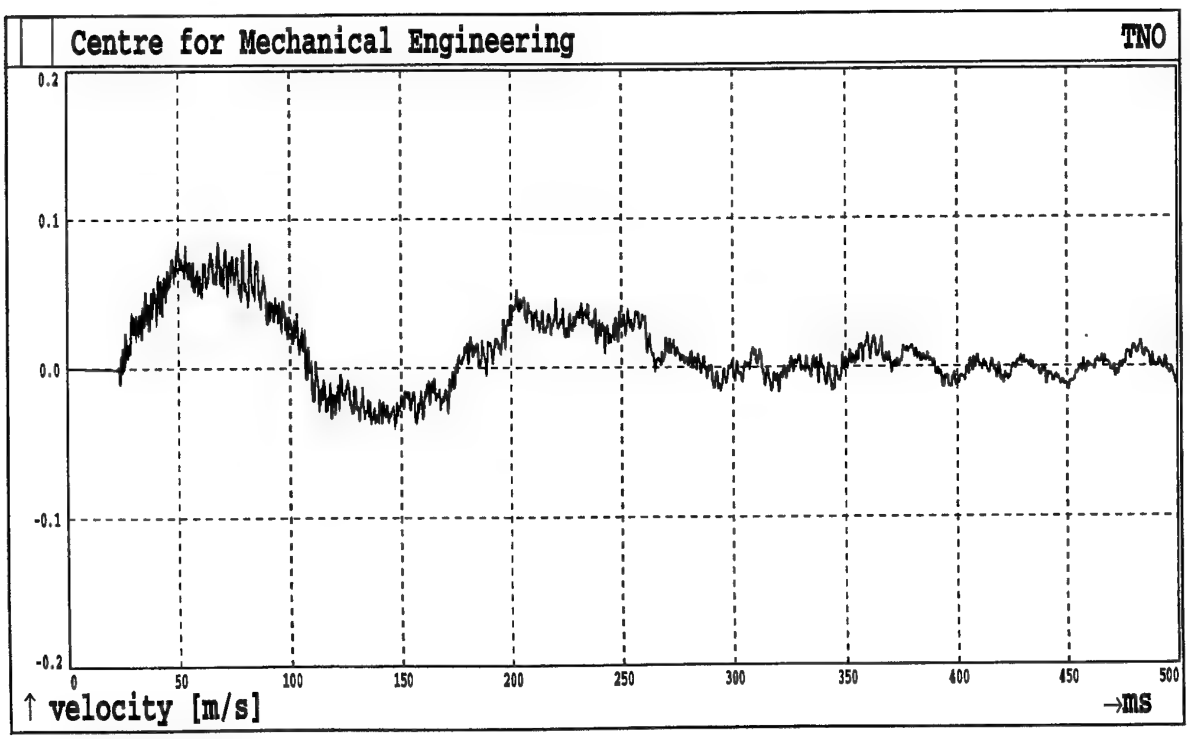


Fig.1B50. Shot 1 Sensor A18

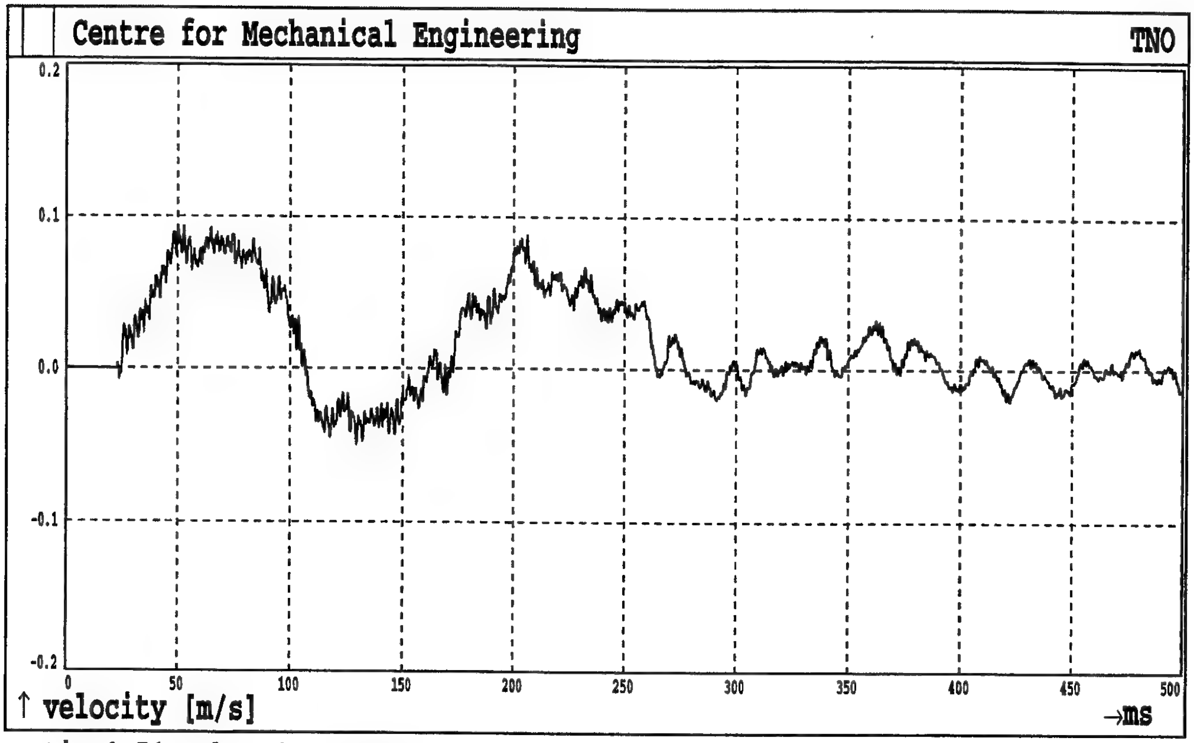


Fig.1B51. Shot 1 Sensor A19

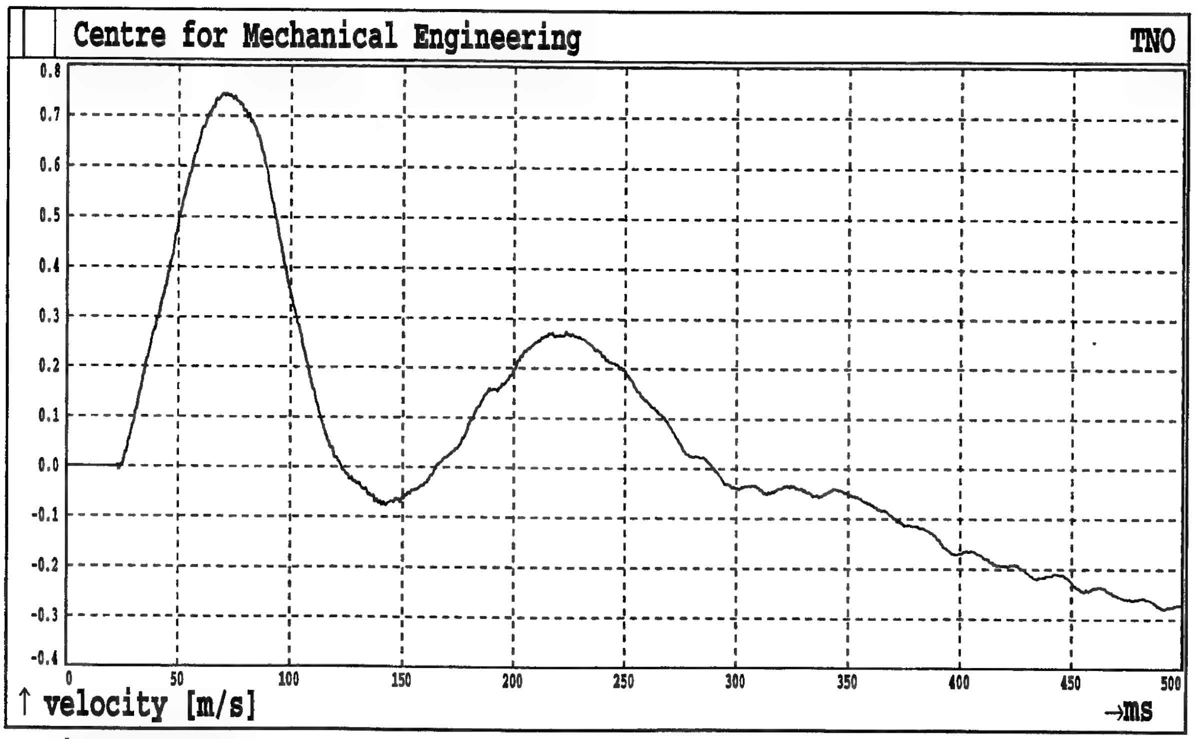


Fig.1B52. Shot 1 Sensor A20

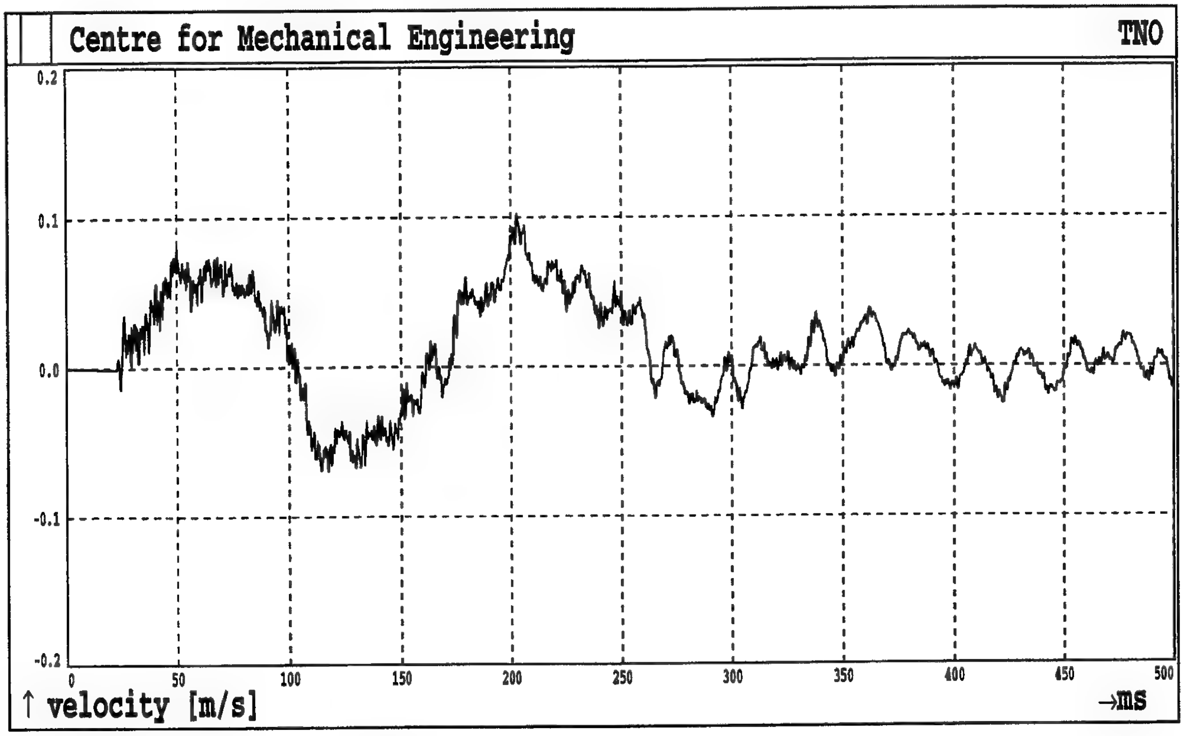


Fig.1B53. Shot 1 Sensor A21

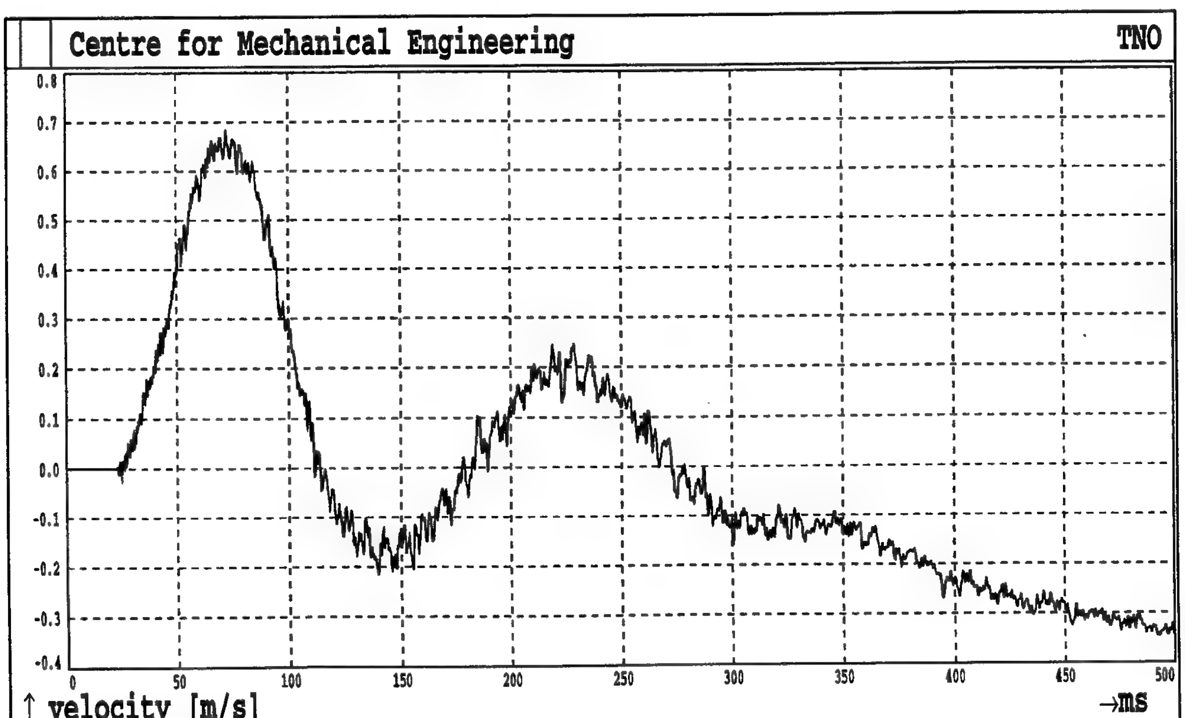


Fig.1B54. Shot 1 Sensor A22

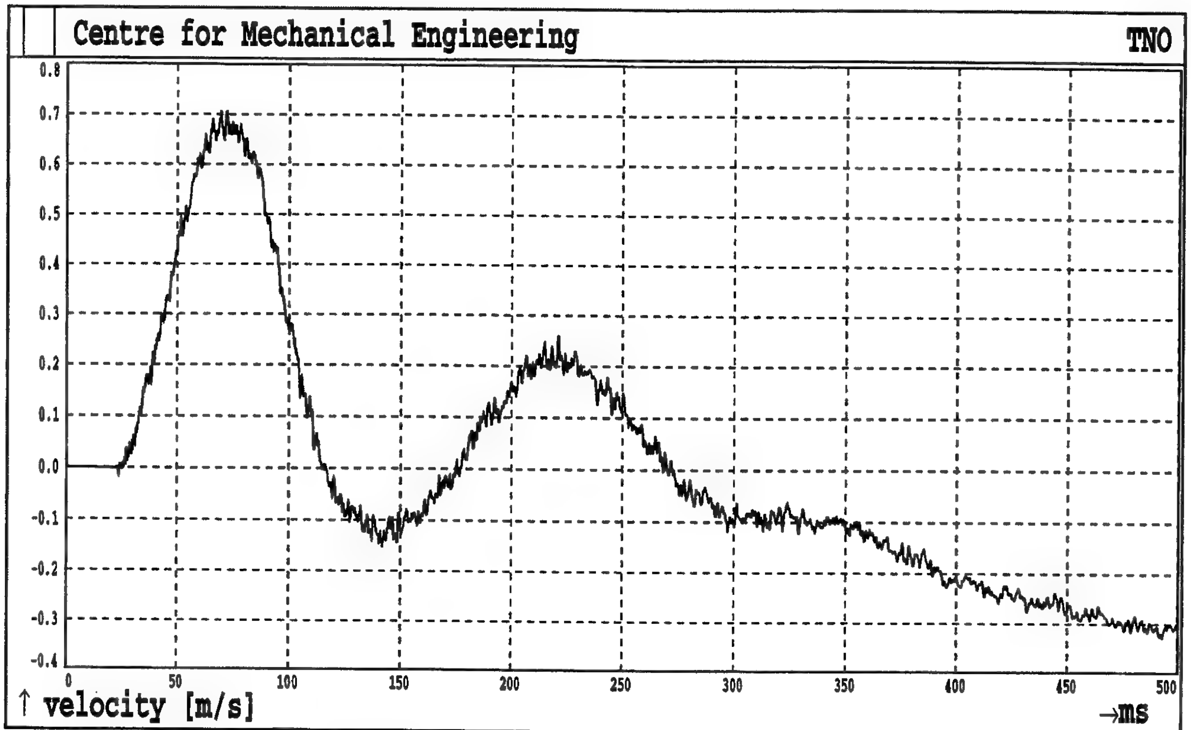


Fig.1B55. Shot 1 Sensor A23

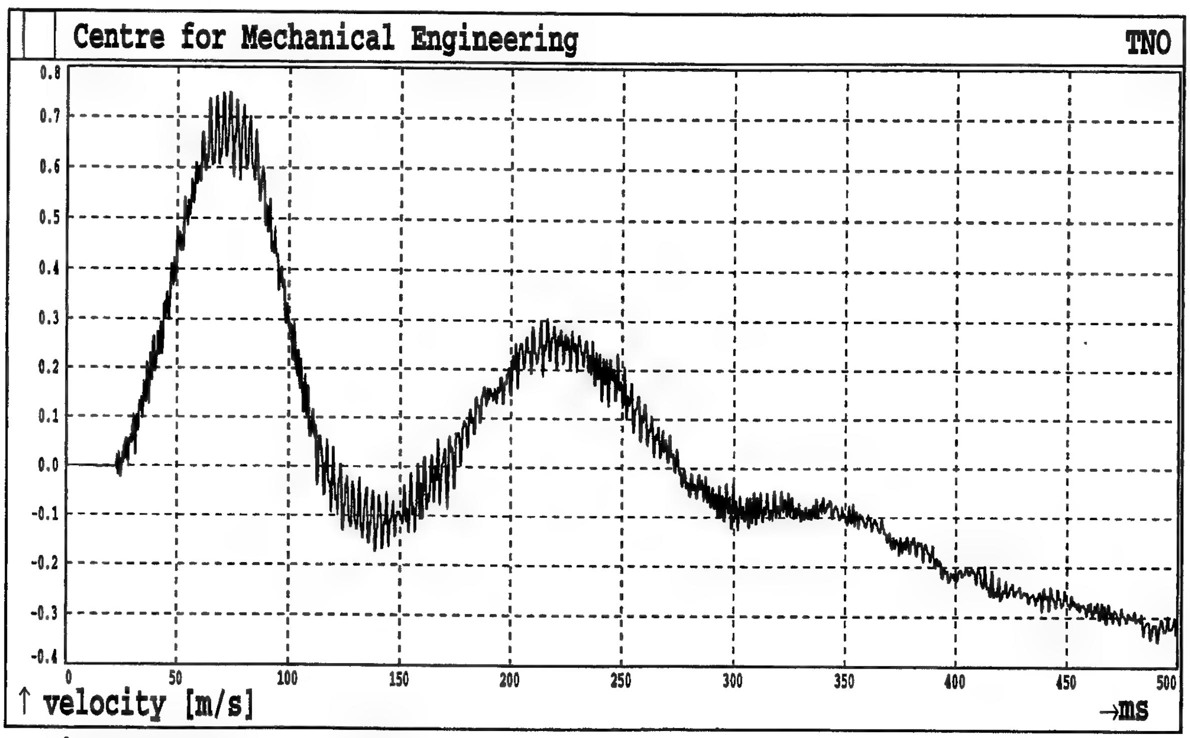


Fig.1B56. Shot 1 Sensor A24

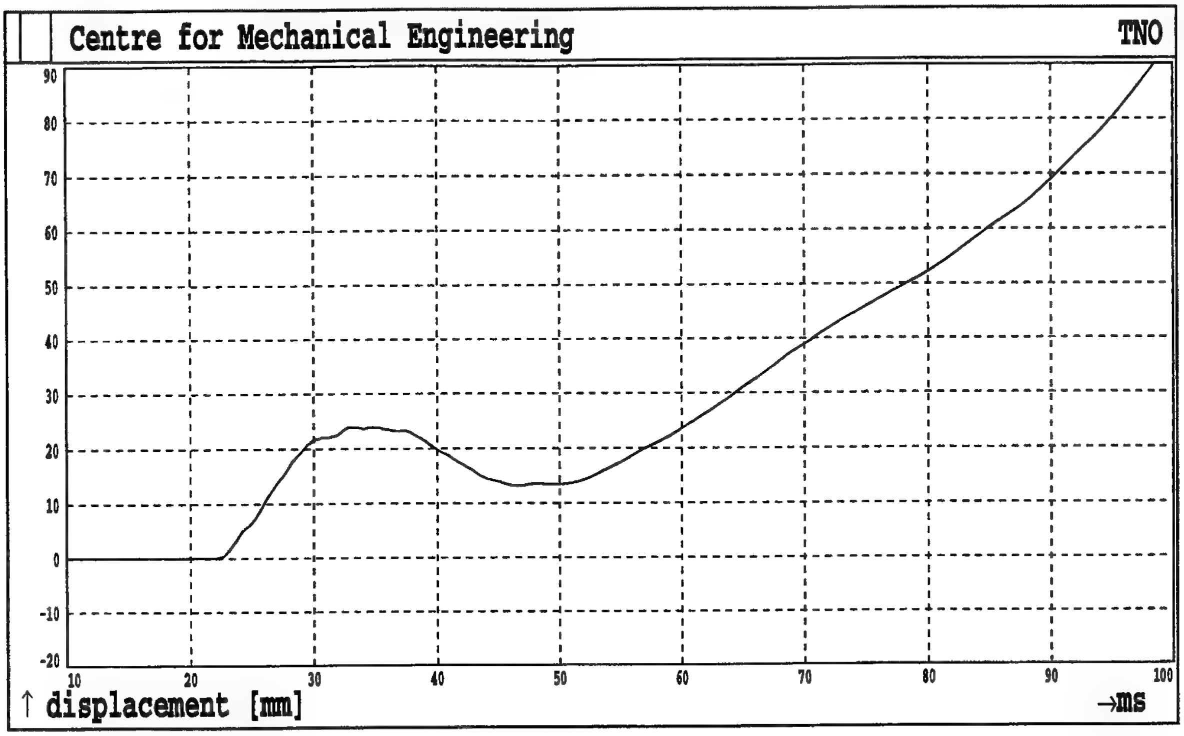


Fig.1B57. Shot 1 Sensor A1

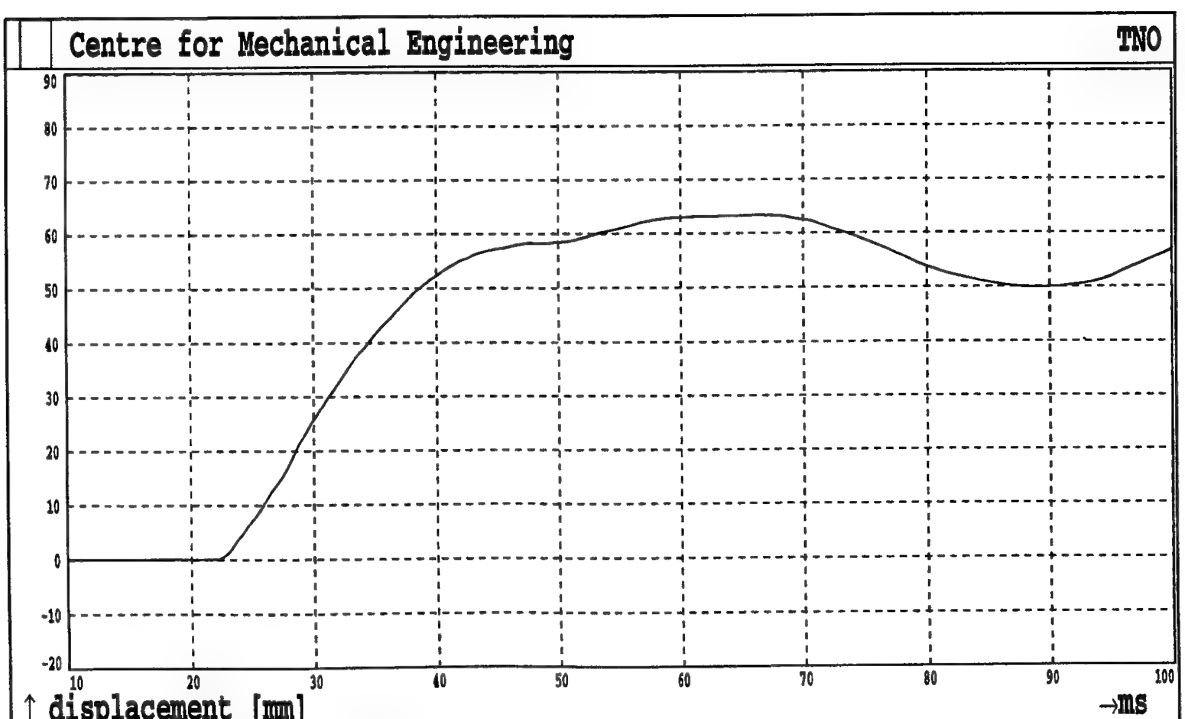


Fig.1B58. Shot 1 Sensor A2

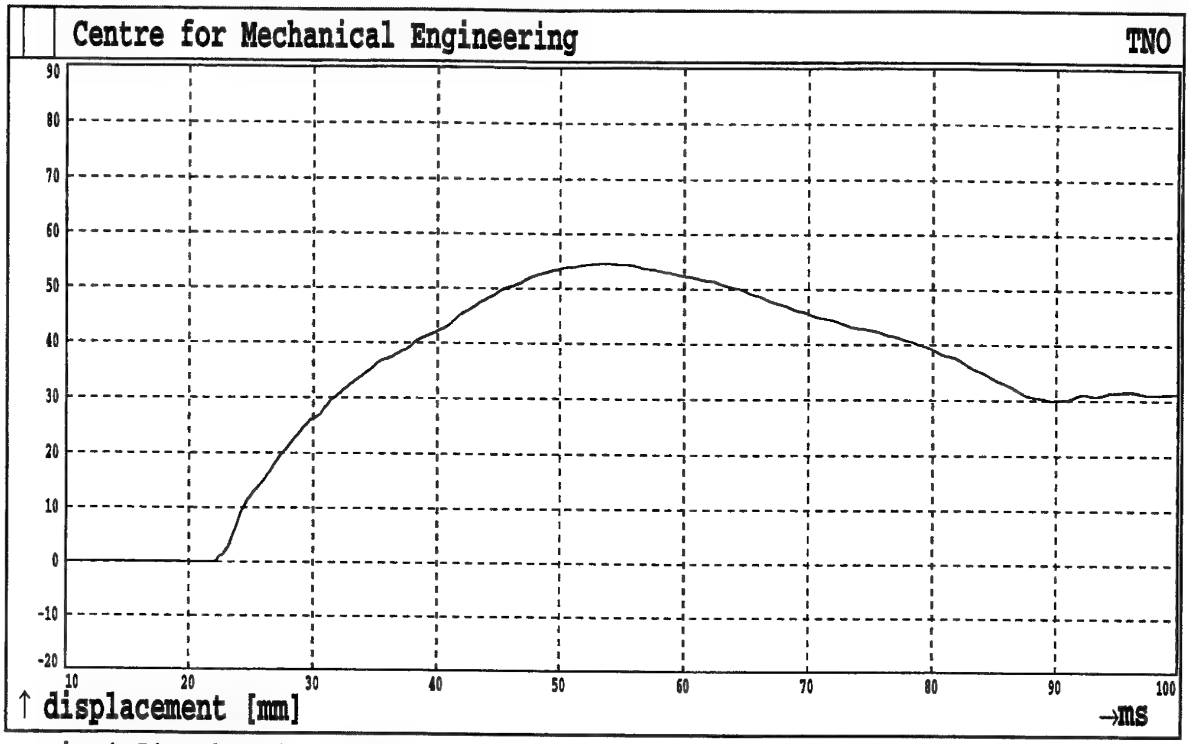


Fig.1B59. Shot 1 Sensor A3

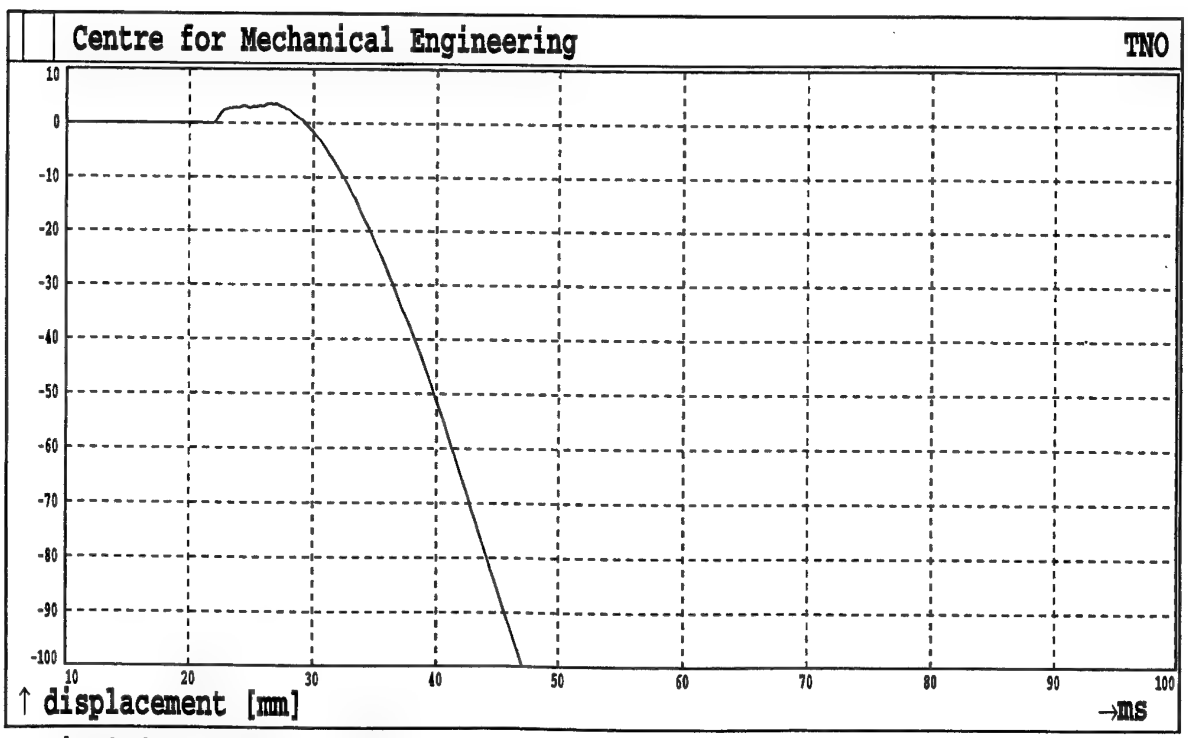


Fig.1B60. Shot 1 Sensor A4

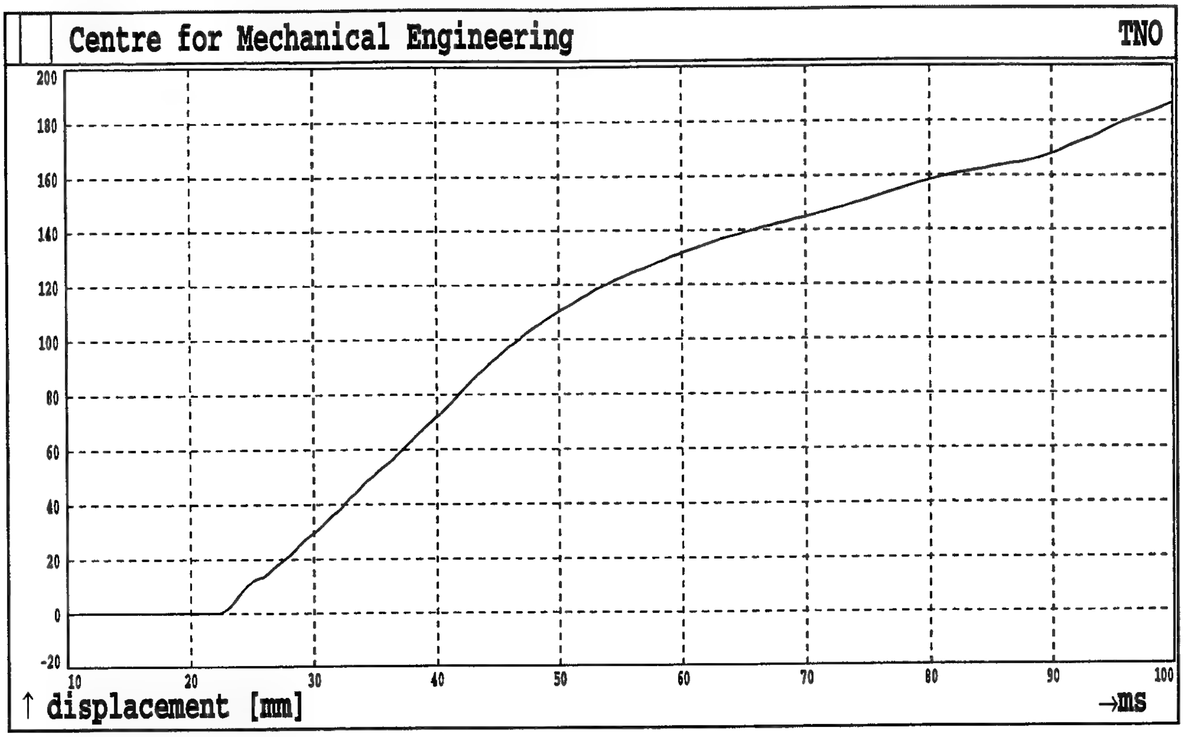


Fig.1B61. Shot 1 Sensor A5

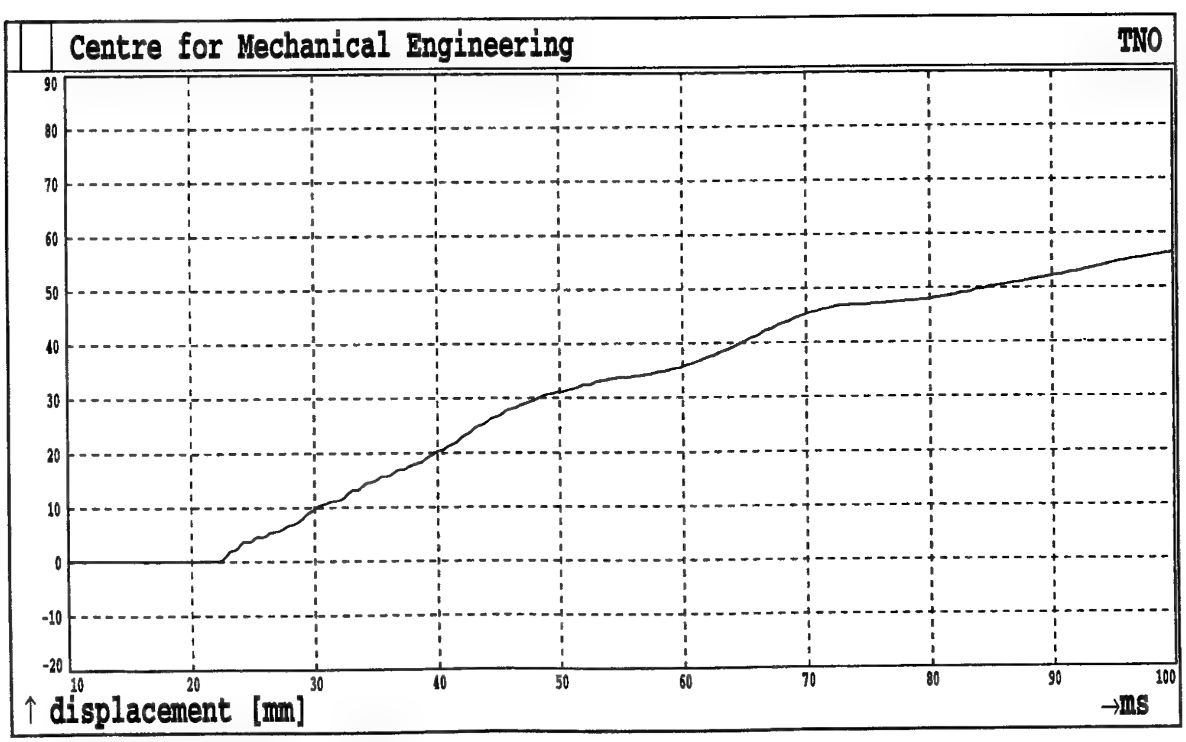


Fig.1B62. Shot 1 Sensor A6

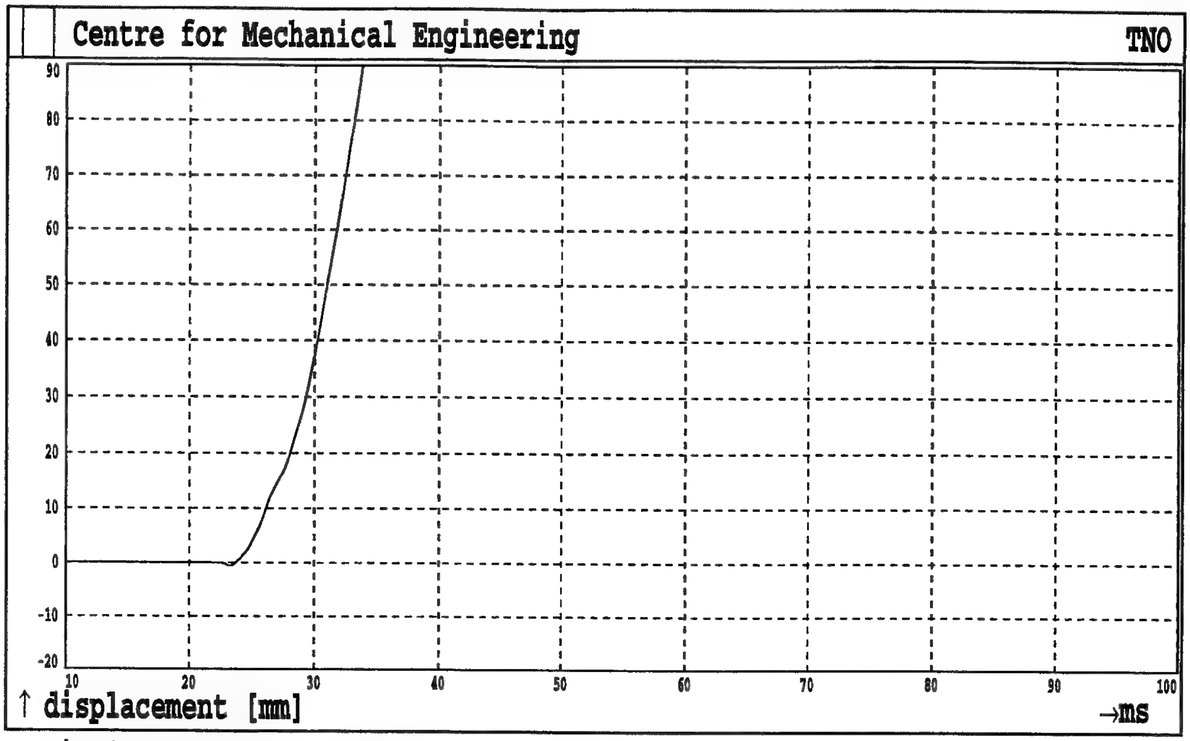


Fig.1B63. Shot 1 Sensor A7

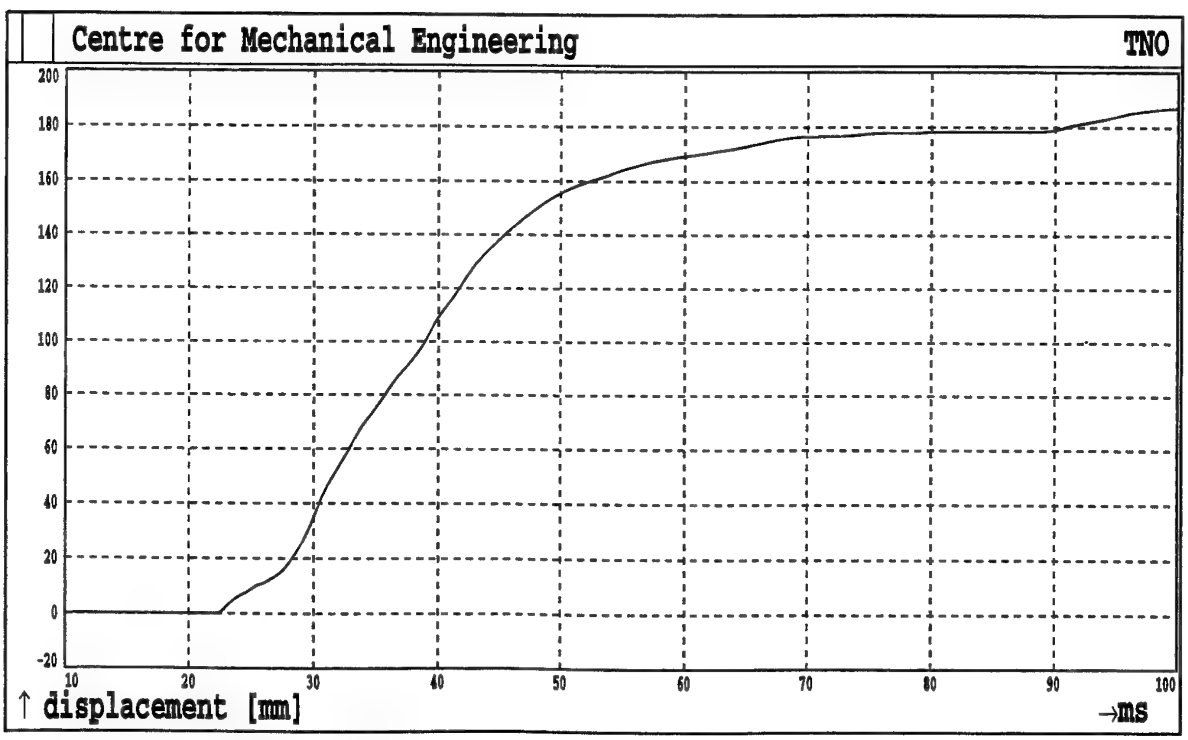


Fig.1B64. Shot 1 Sensor A8

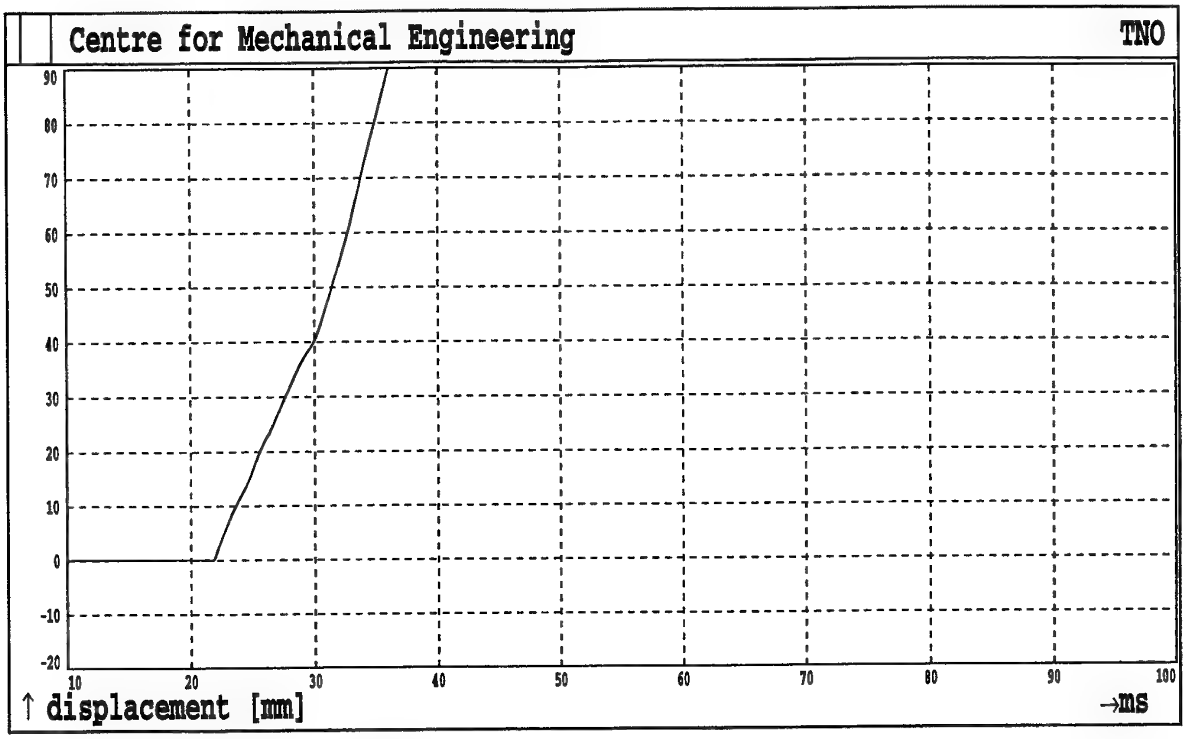


Fig.1B65. Shot 1 Sensor A9

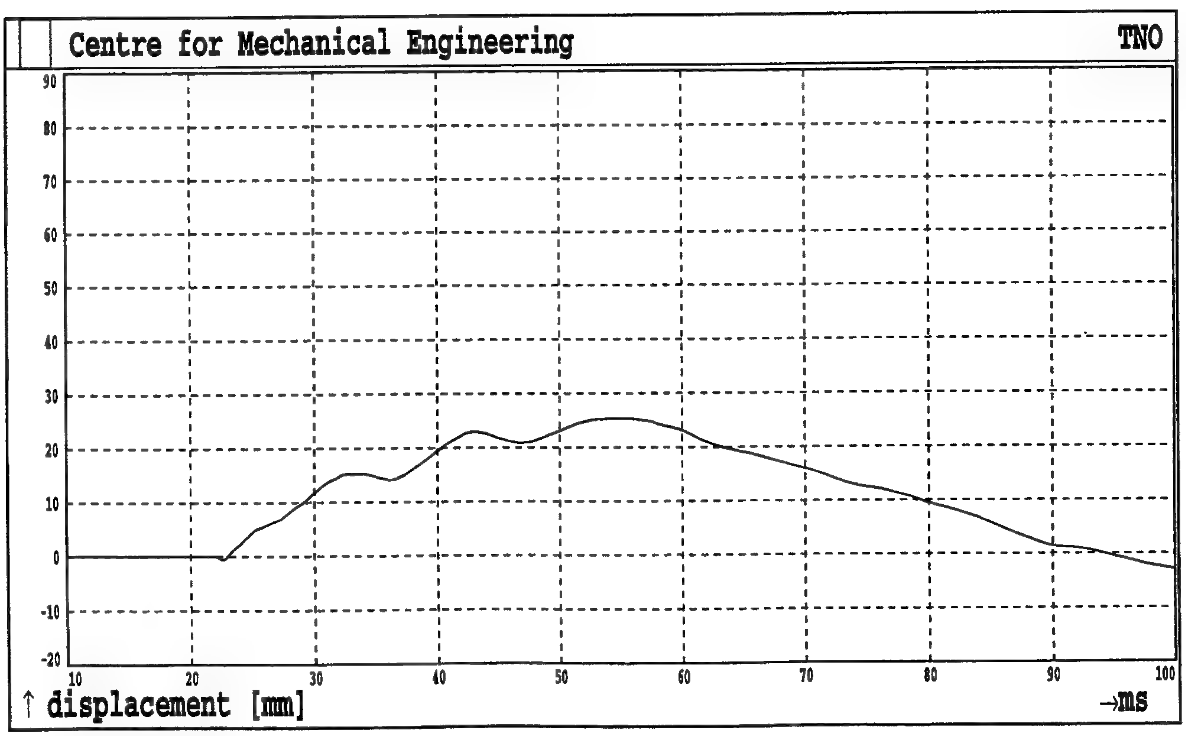


Fig.1B66. Shot 1 Sensor A10

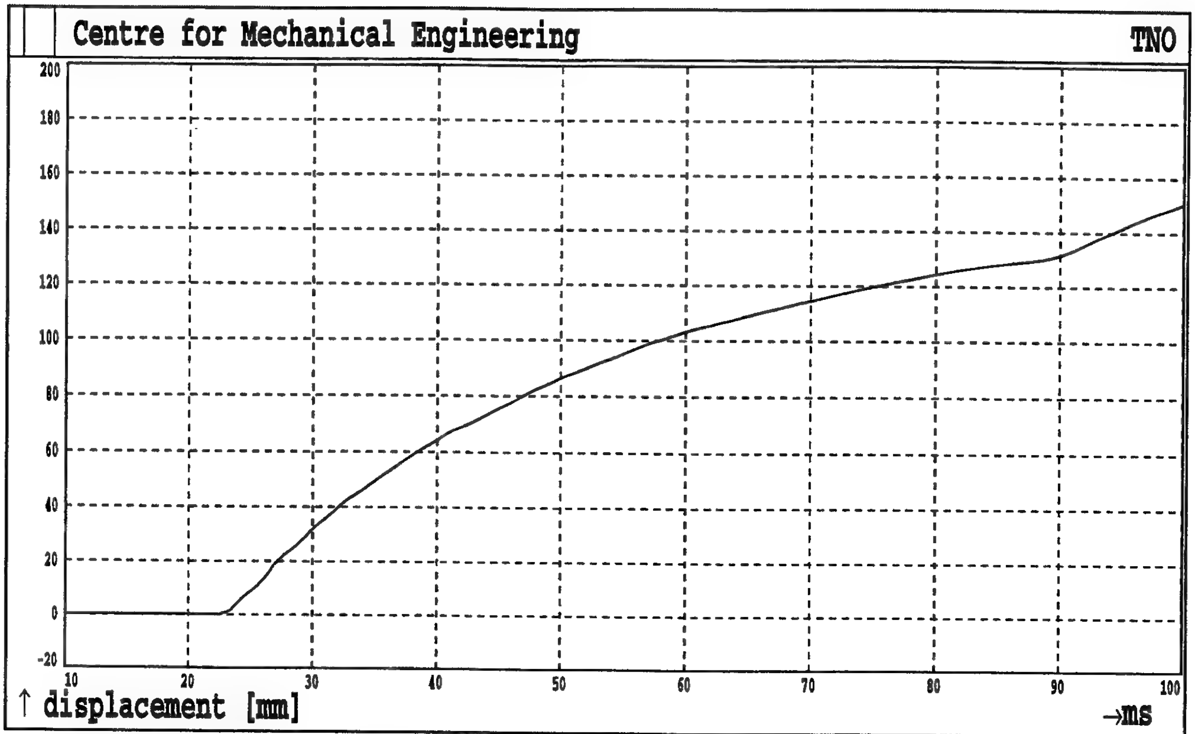


Fig.1B67. Shot 1 Sensor A11

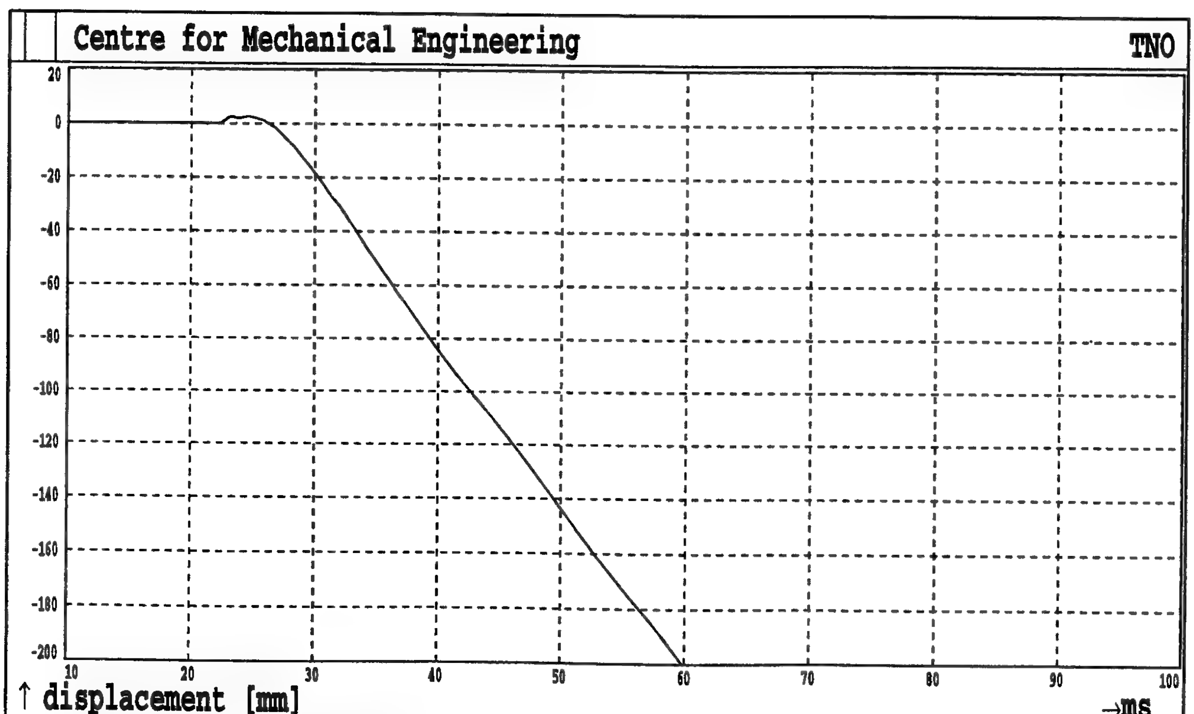


Fig.1B68. Shot 1 Sensor A12

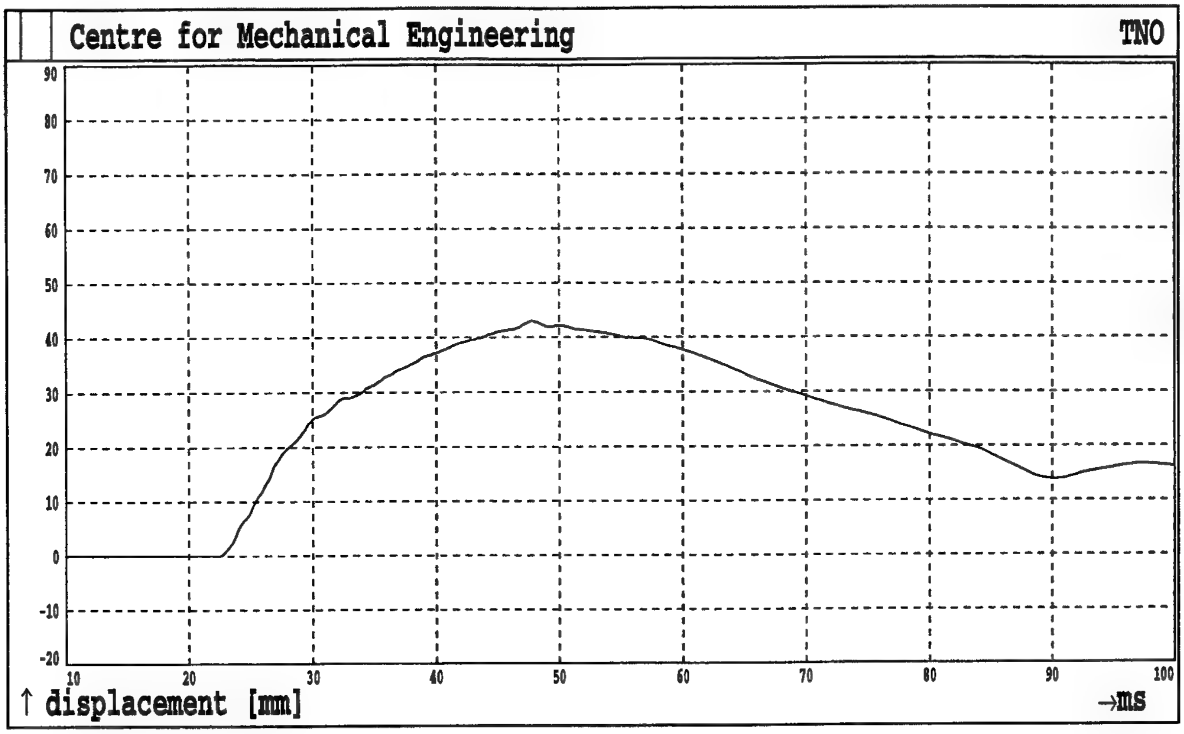


Fig.1B69. Shot 1 Sensor A13

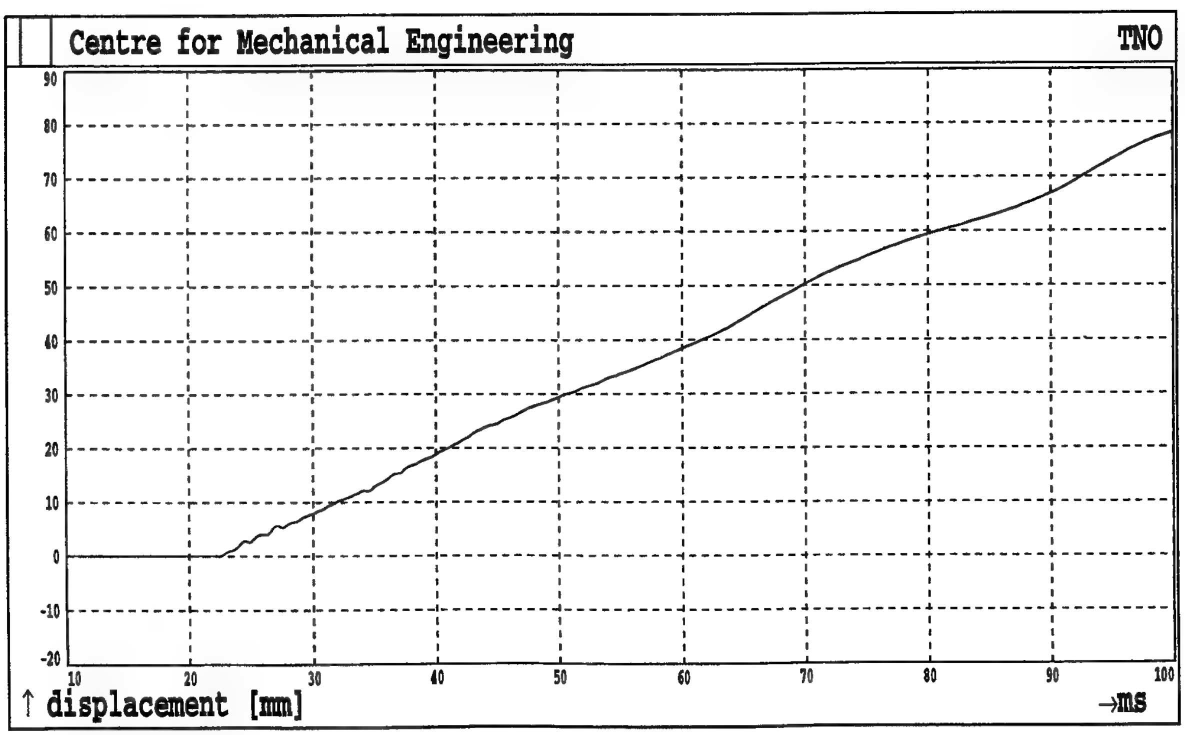


Fig.1B70. Shot 1 Sensor A14

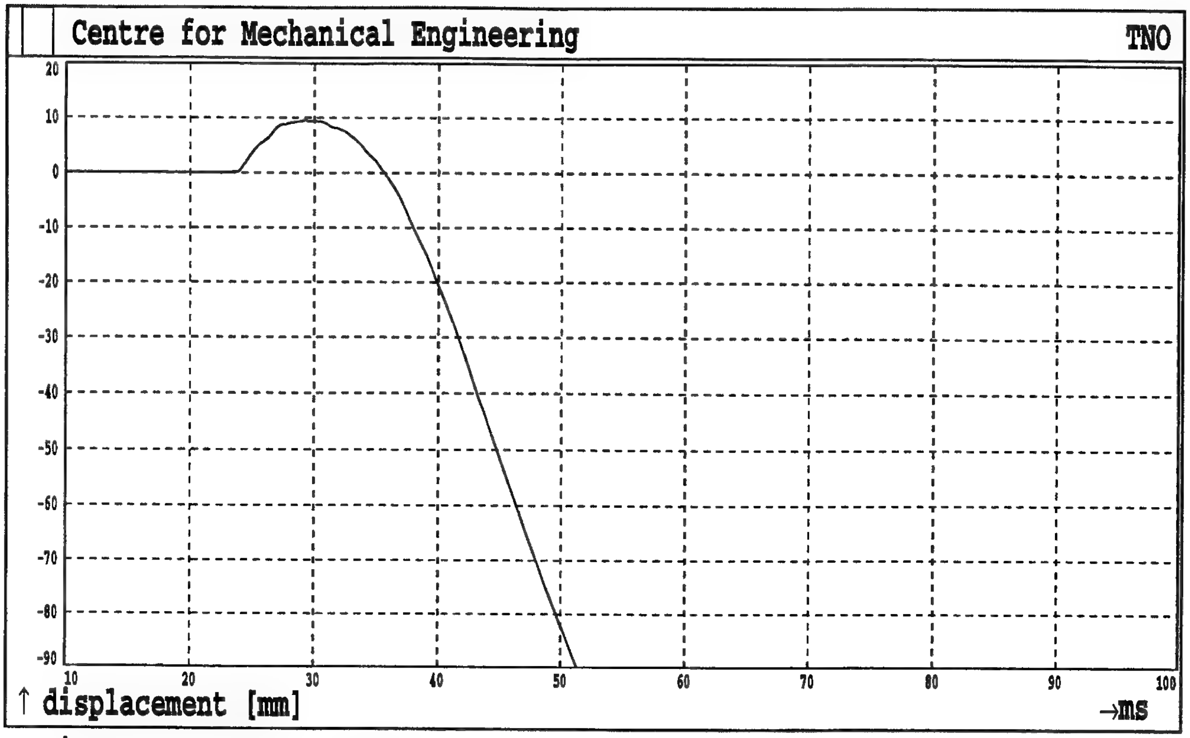


Fig.1B71. Shot 1 Sensor A15

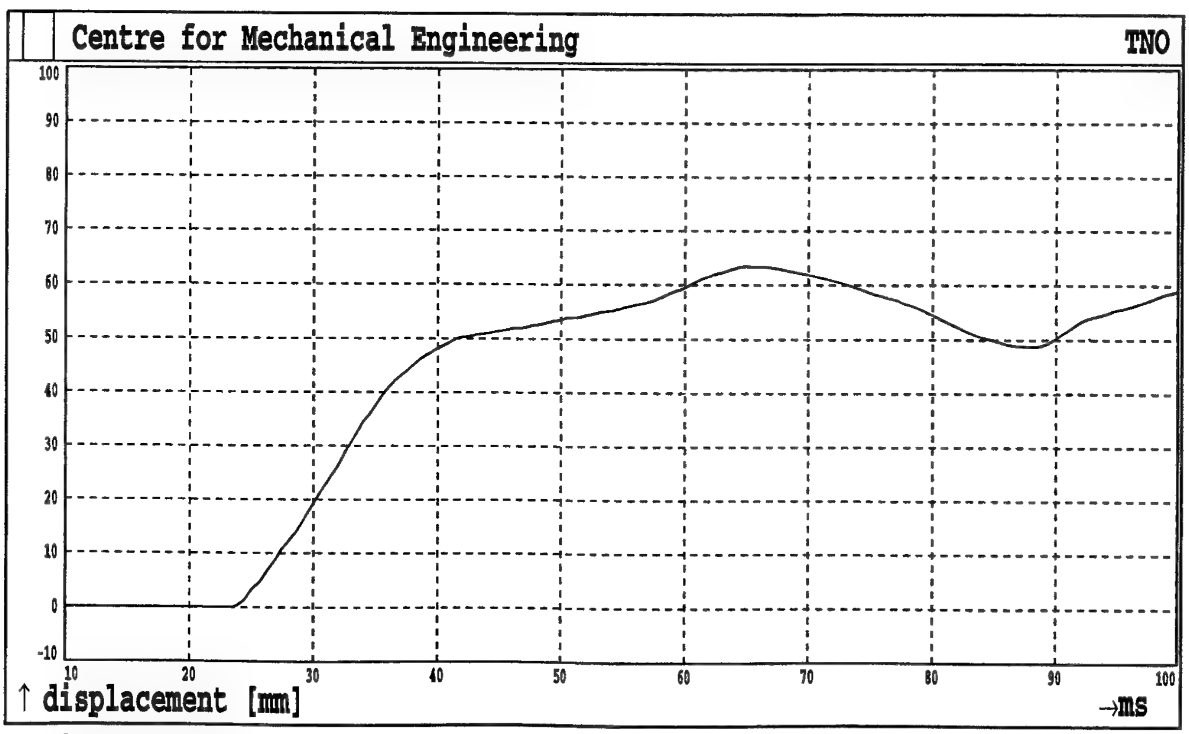


Fig.1B72. Shot 1 Sensor A16

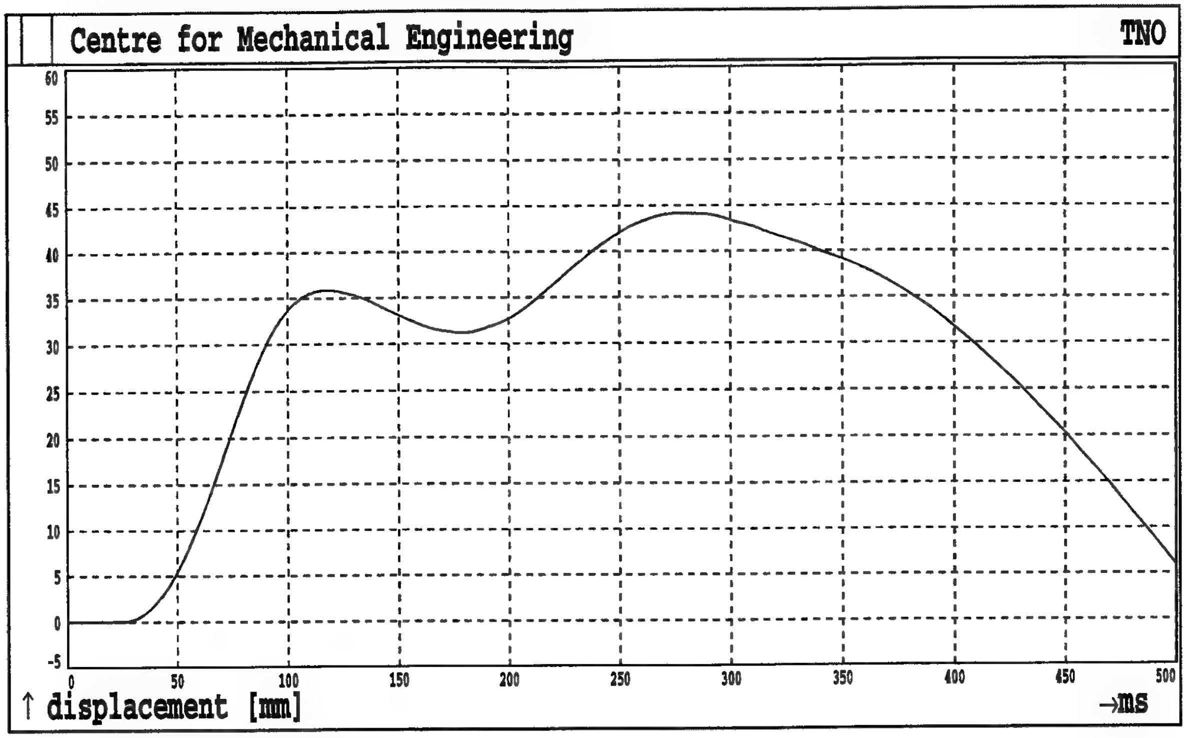


Fig.1B73. Shot 1 Sensor A17

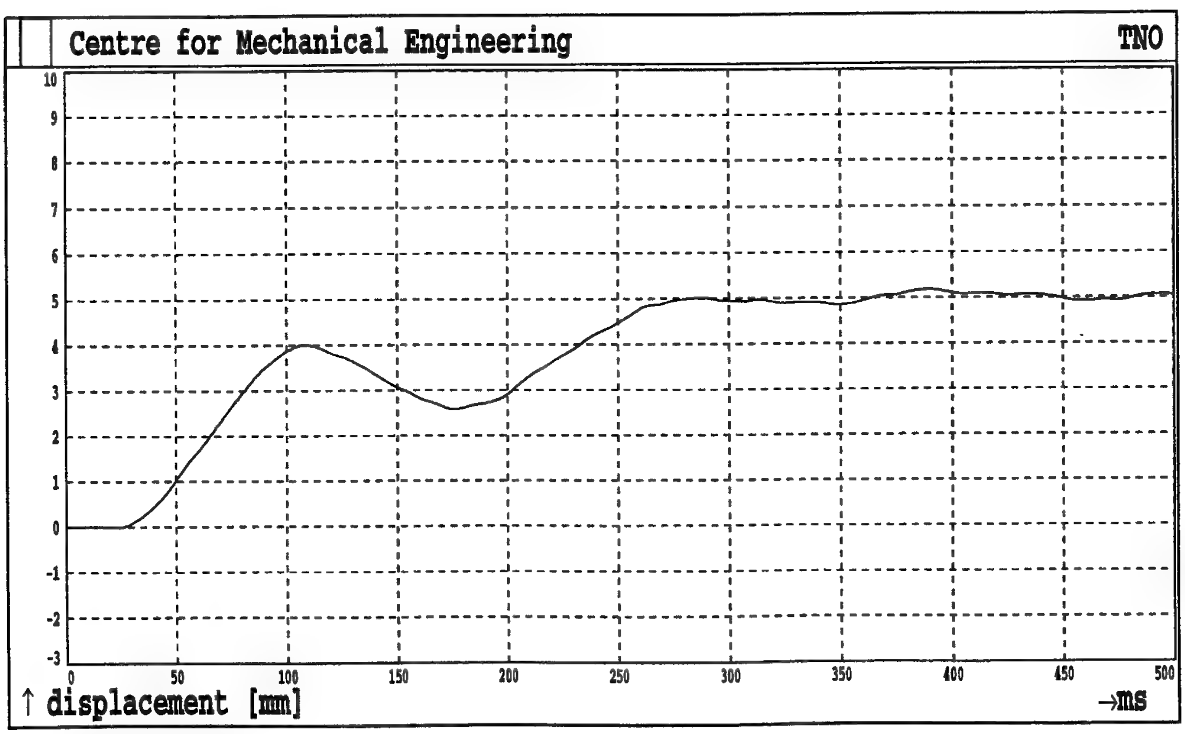


Fig.1B74. Shot 1 Sensor A18

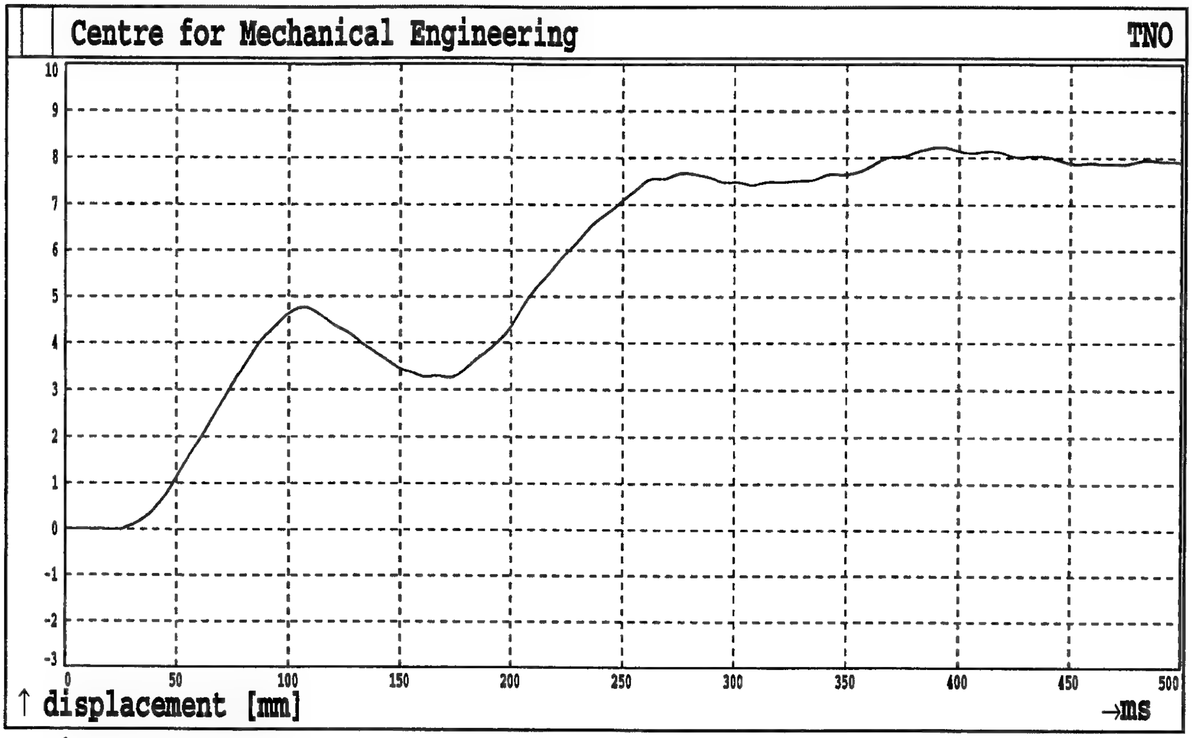


Fig.1B75. Shot 1 Sensor A19

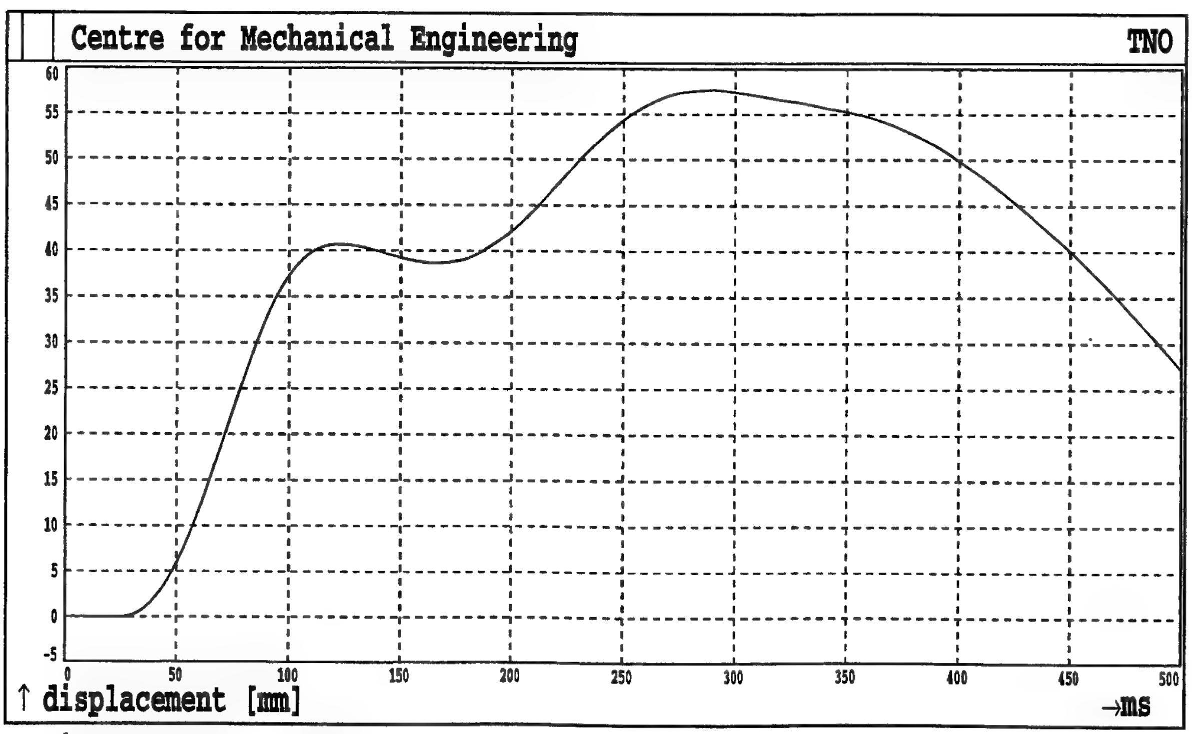


Fig.1B76. Shot 1 Sensor A20

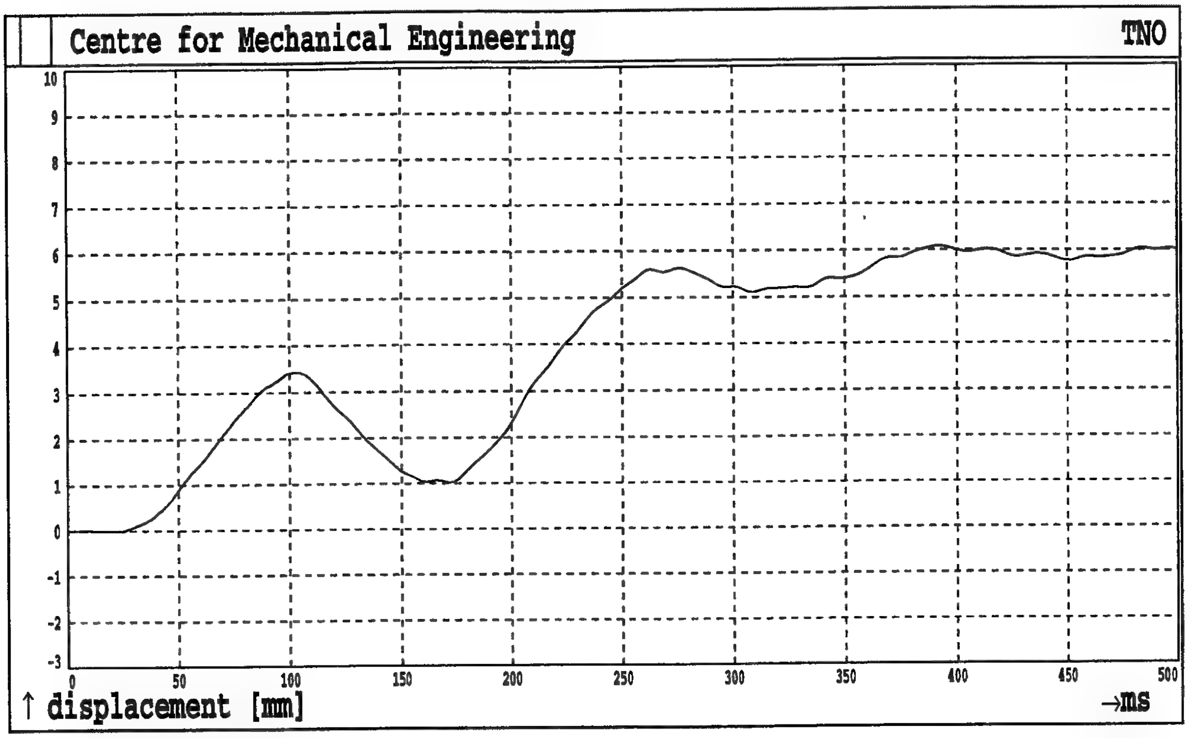


Fig.1B77. Shot 1 Sensor A21

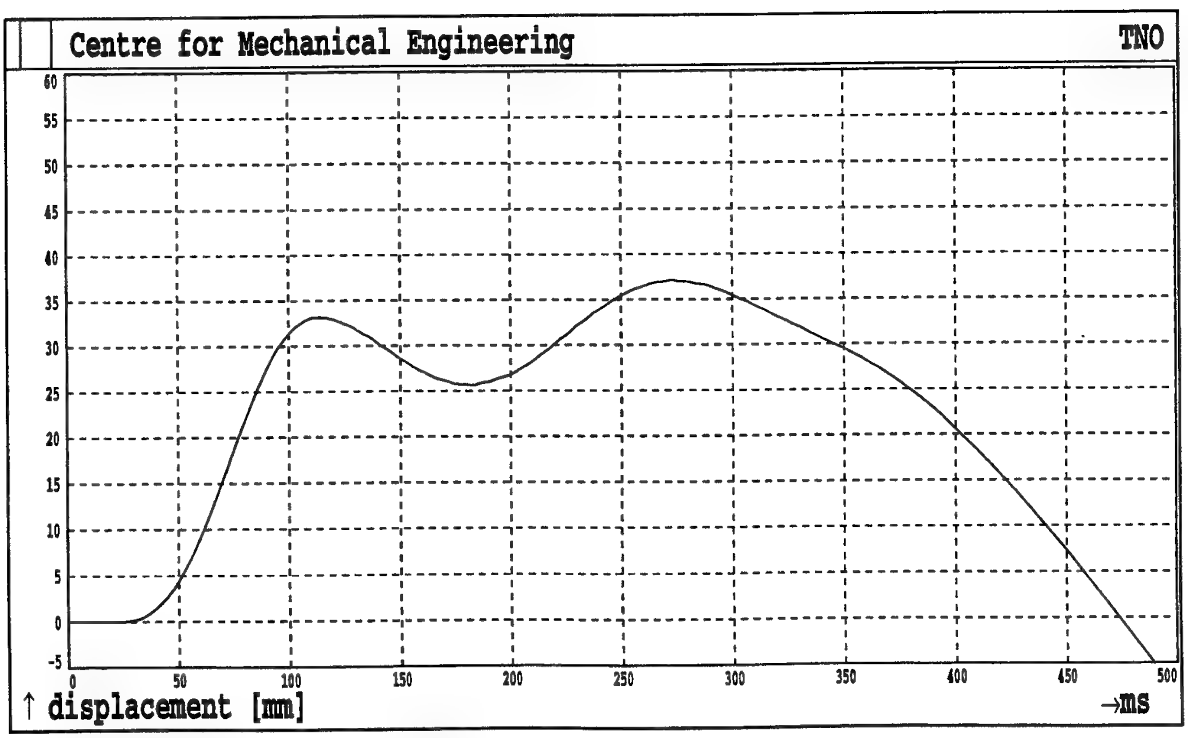


Fig.1B78. Shot 1 Sensor A22

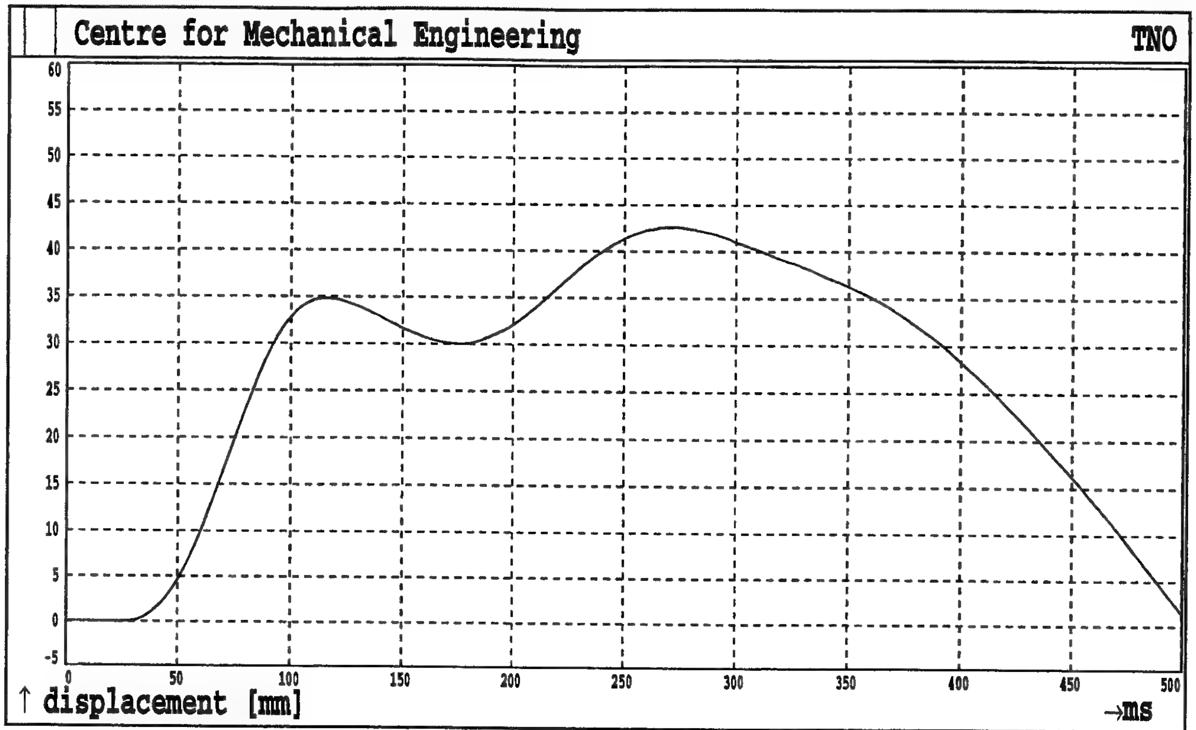


Fig.1B79. Shot 1 Sensor A23

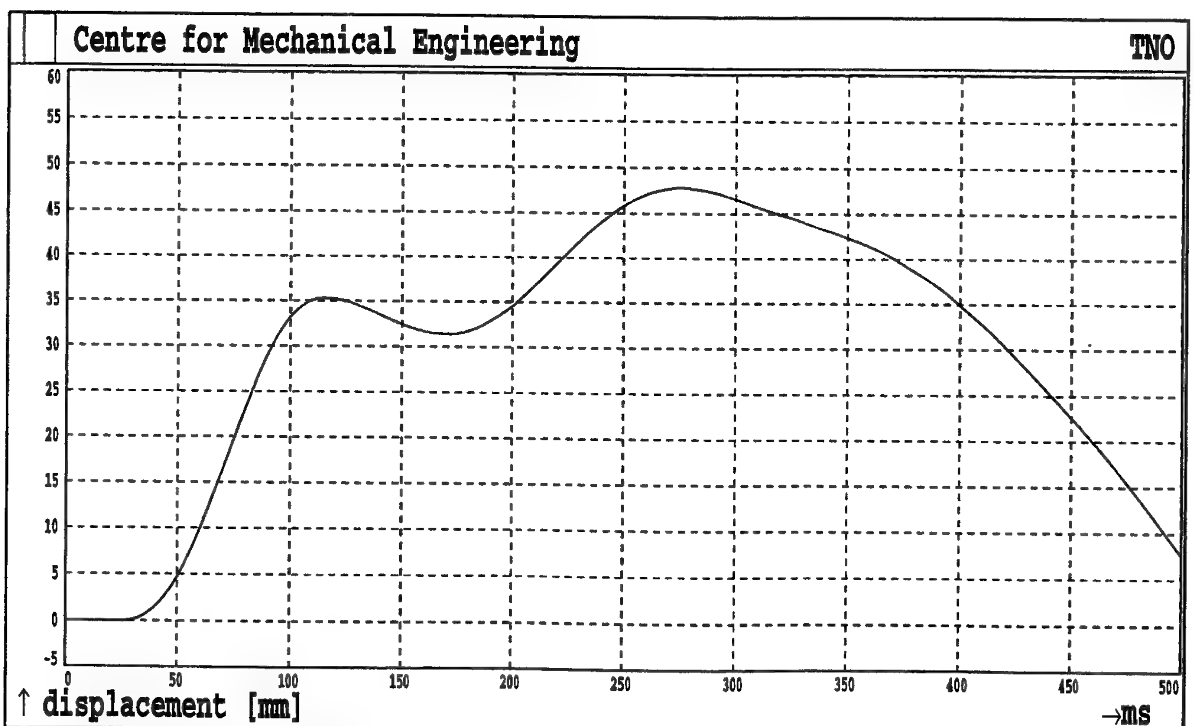


Fig.1B80. Shot 1 Sensor A24

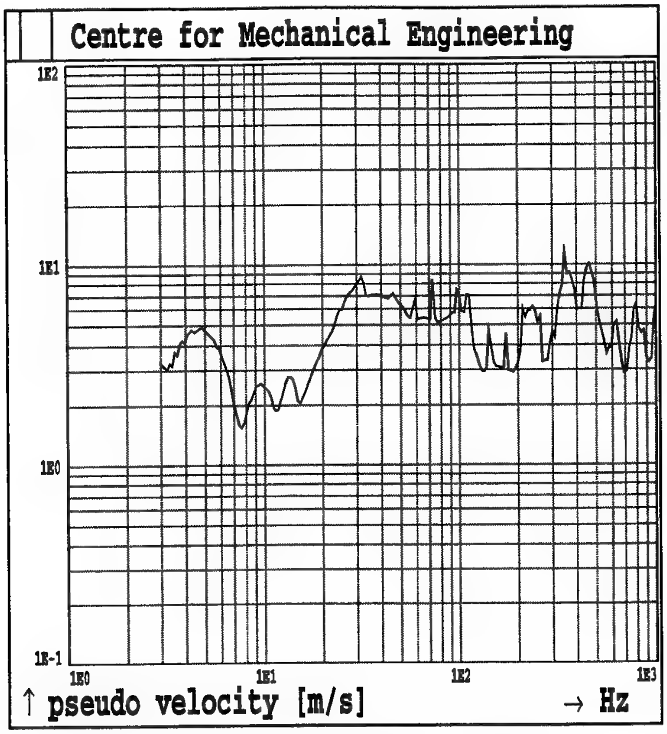


Fig.1B81. Shot 1 MAXIMAX Sensor A1

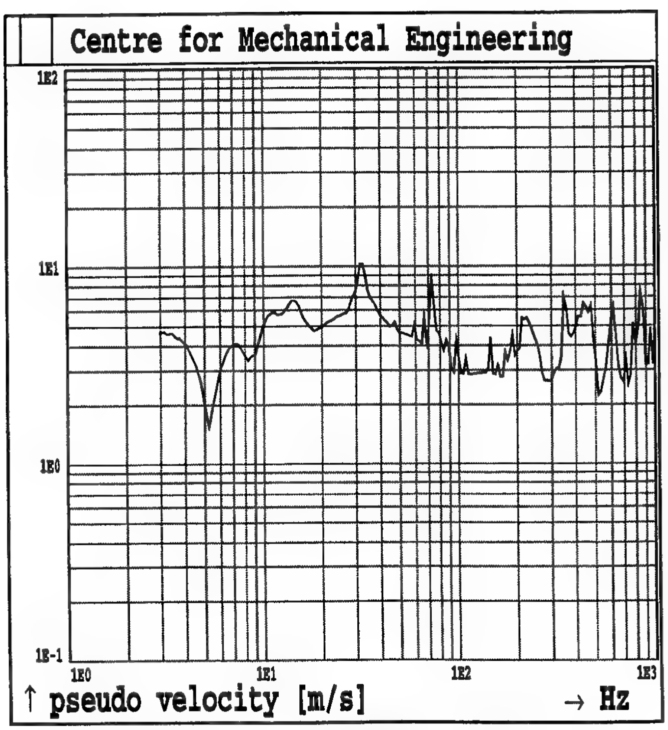


Fig.1B82. Shot 1 MAXIMAX Sensor A2

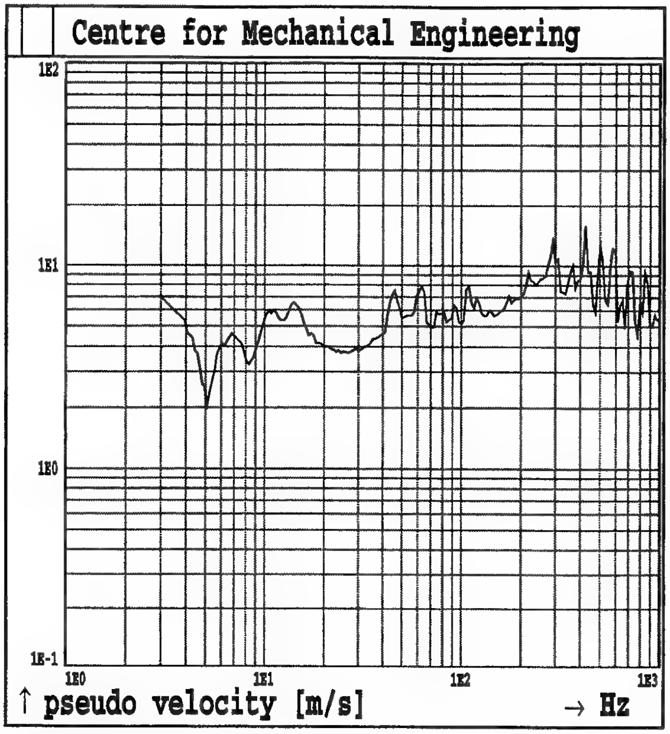


Fig.1B83. Shot 1 MAXIMAX Sensor A3

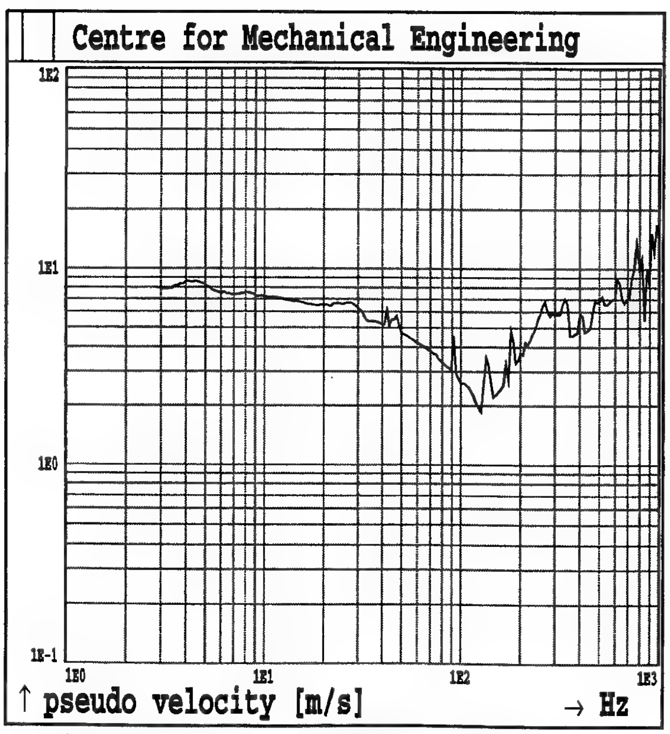


Fig.1B84. Shot 1 MAXIMAX Sensor A4

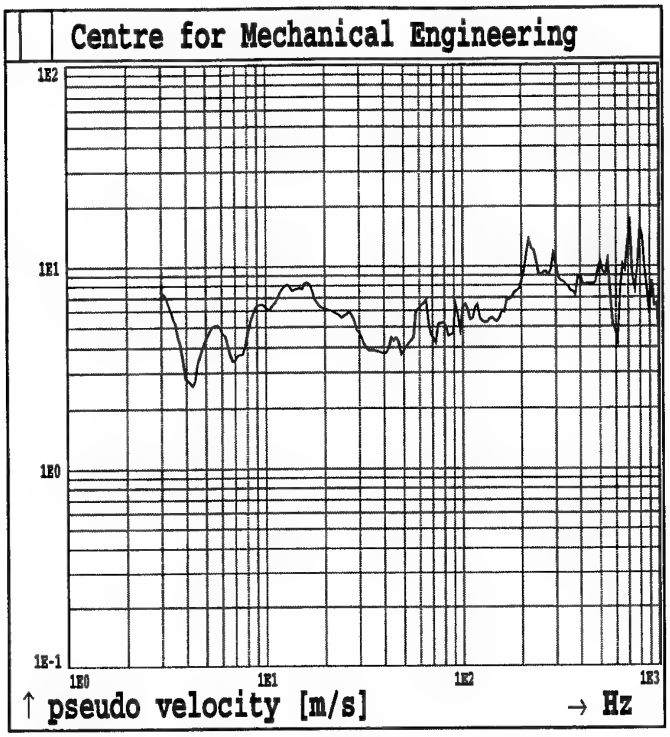


Fig.1B85. Shot 1 MAXIMAX Sensor A5

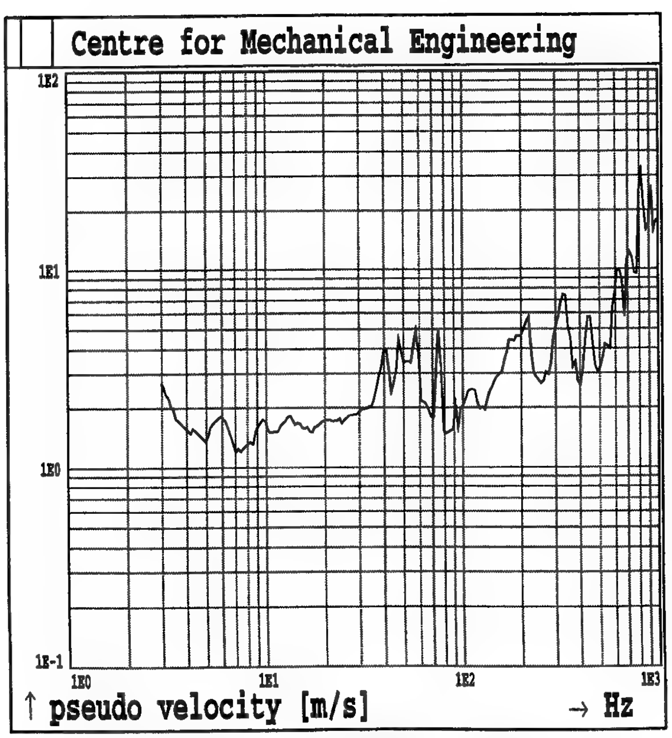


Fig.1B86. Shot 1 MAXIMAX Sensor A6

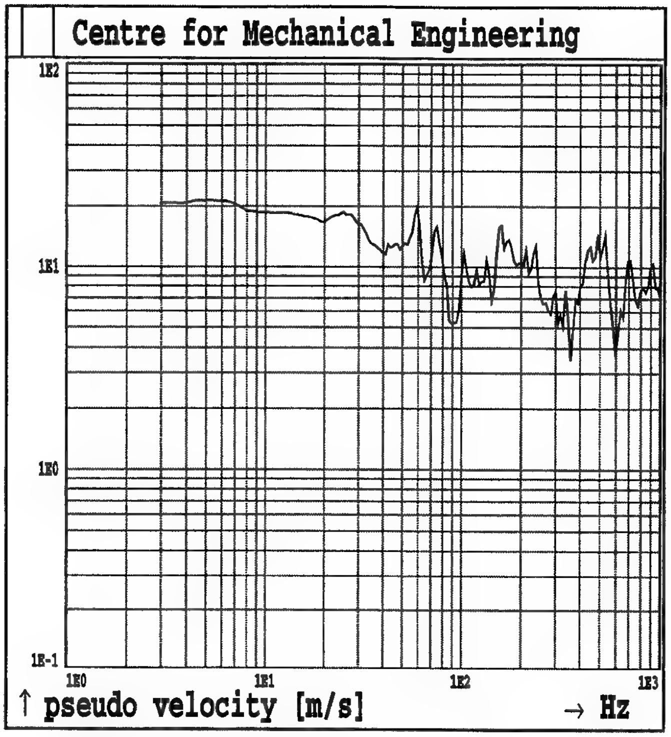


Fig.1B87. Shot 1 MAXIMAX Sensor A7

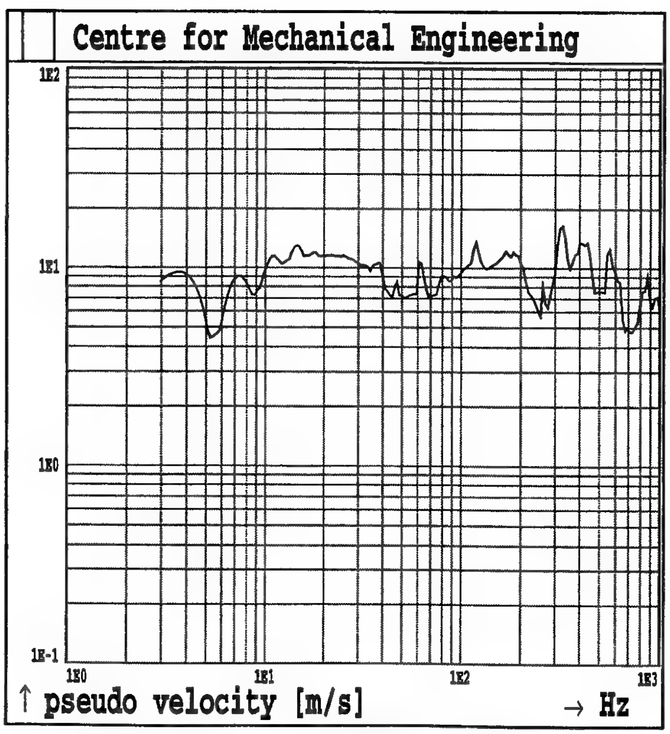


Fig.1B88. Shot 1 MAXIMAX Sensor A8

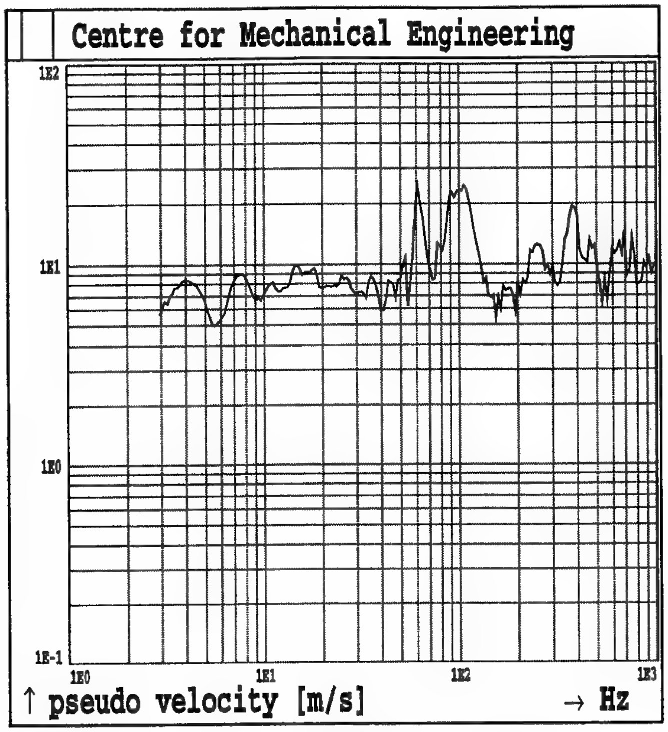


Fig.1B89. Shot 1 MAXIMAX Sensor A9

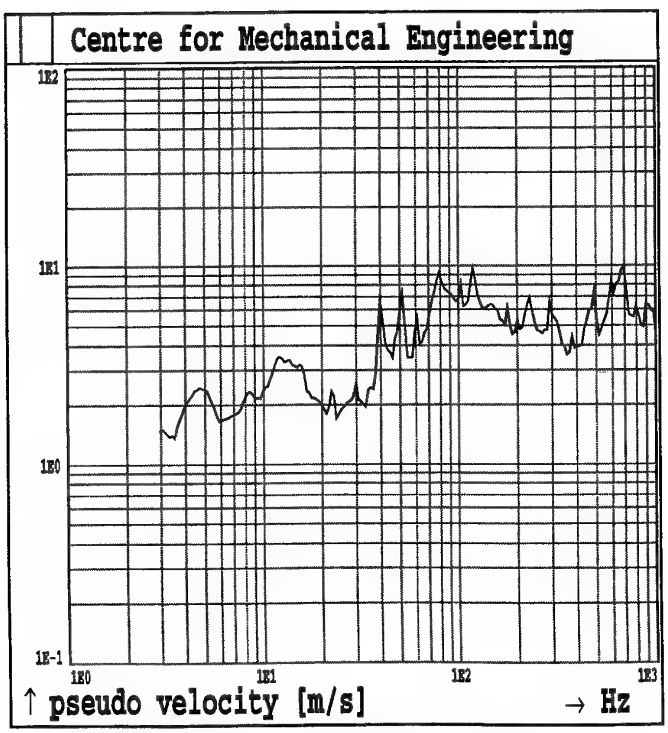


Fig.1B90. Shot 1 MAXIMAX Sensor A10

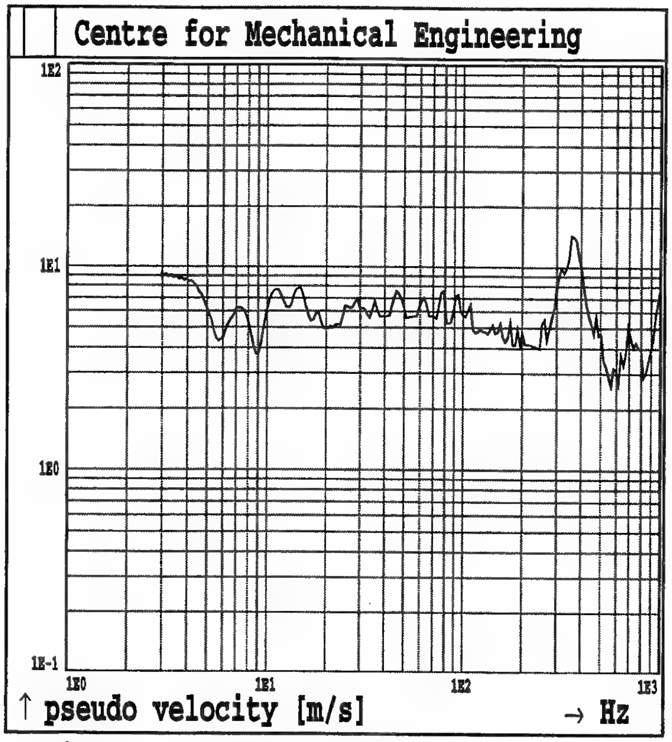


Fig.1B91. Shot 1 MAXIMAX Sensor A11

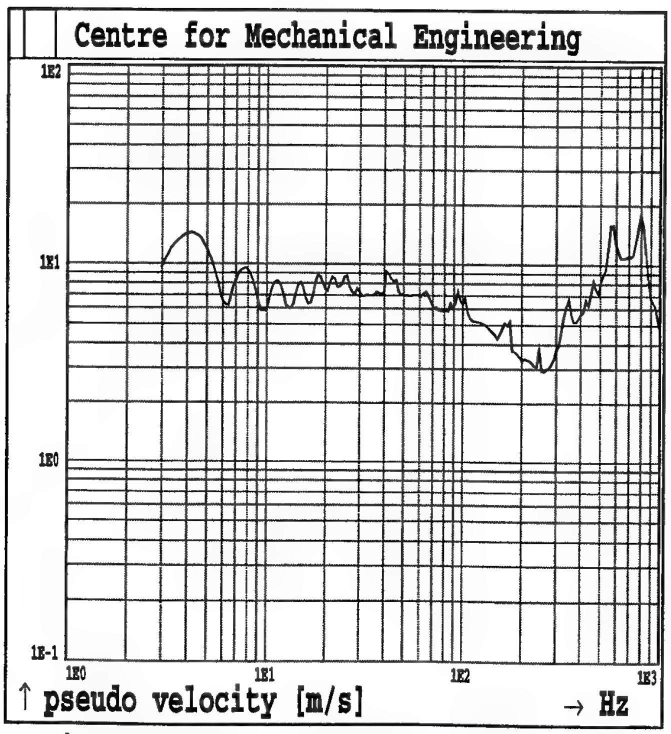


Fig.1B92. Shot 1 MAXIMAX Sensor A12

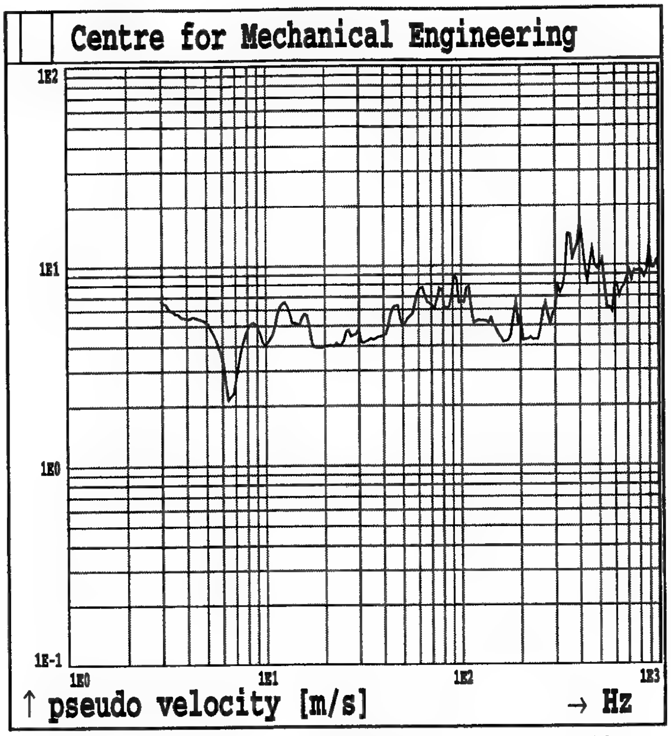


Fig.1B93. Shot 1 MAXIMAX Sensor A13

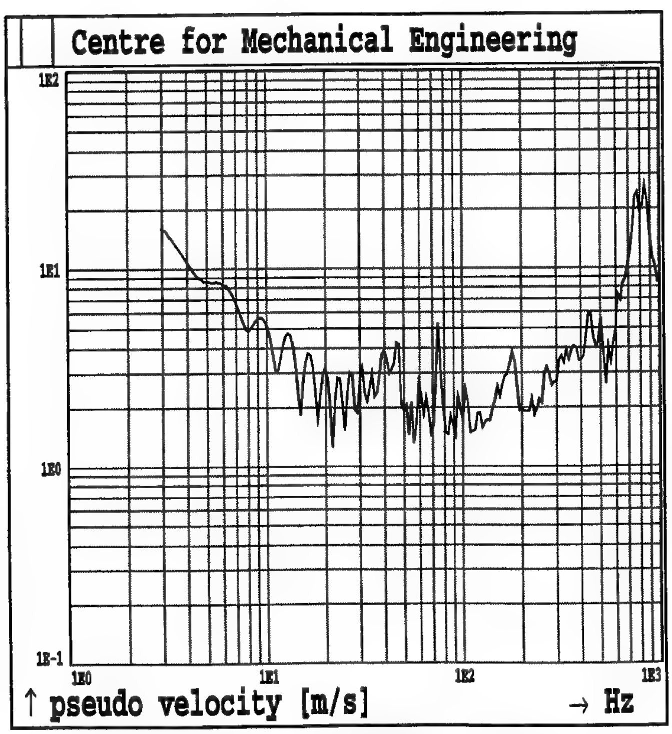


Fig.1B94. Shot 1 MAXIMAX Sensor A14

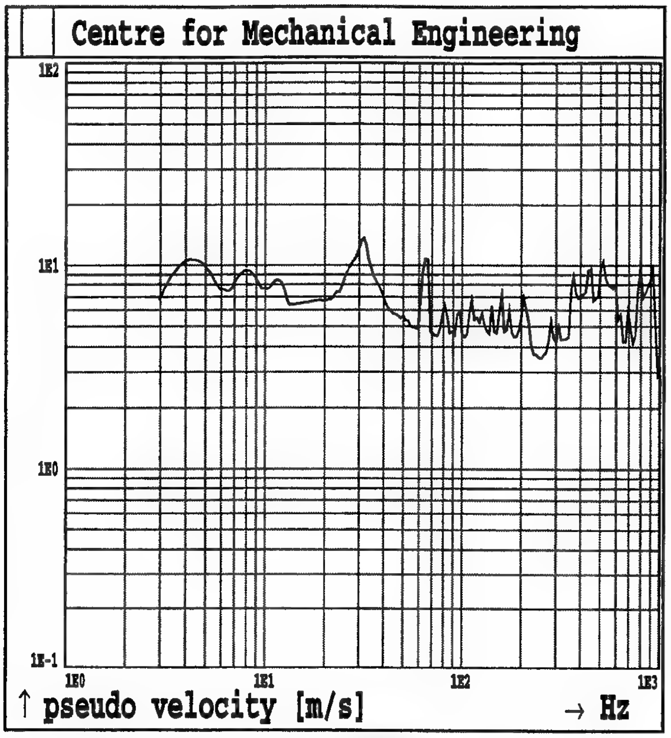


Fig.1B95. Shot 1 MAXIMAX Sensor A15

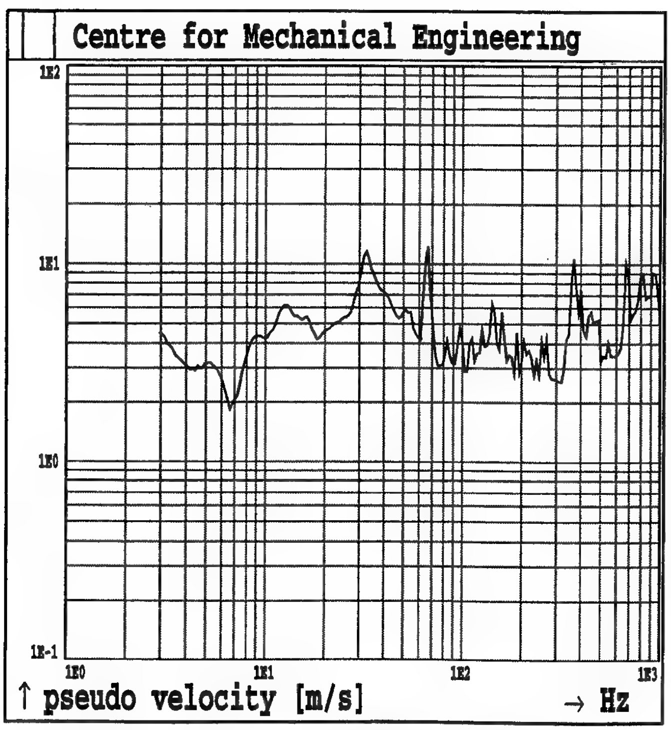


Fig.1B96. Shot 1 MAXIMAX Sensor A16

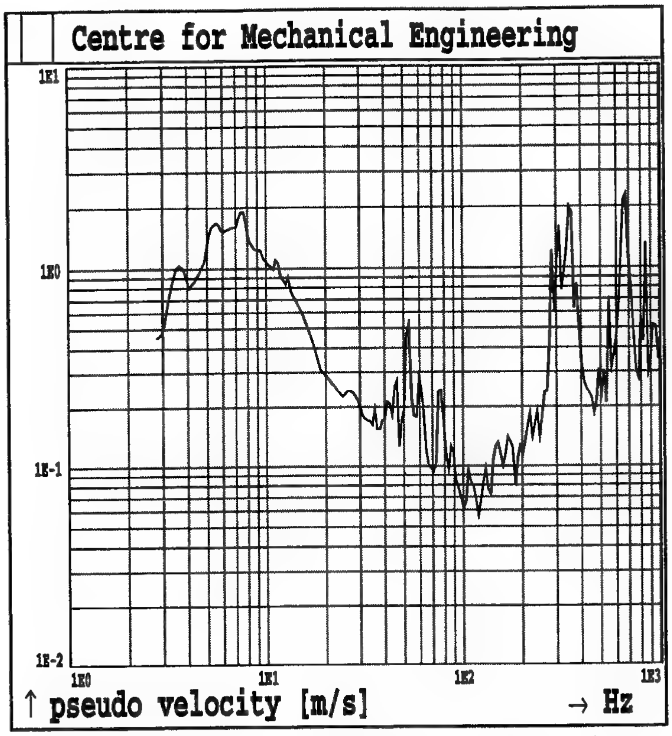


Fig.1B97. Shot 1 MAXIMAX Sensor A17

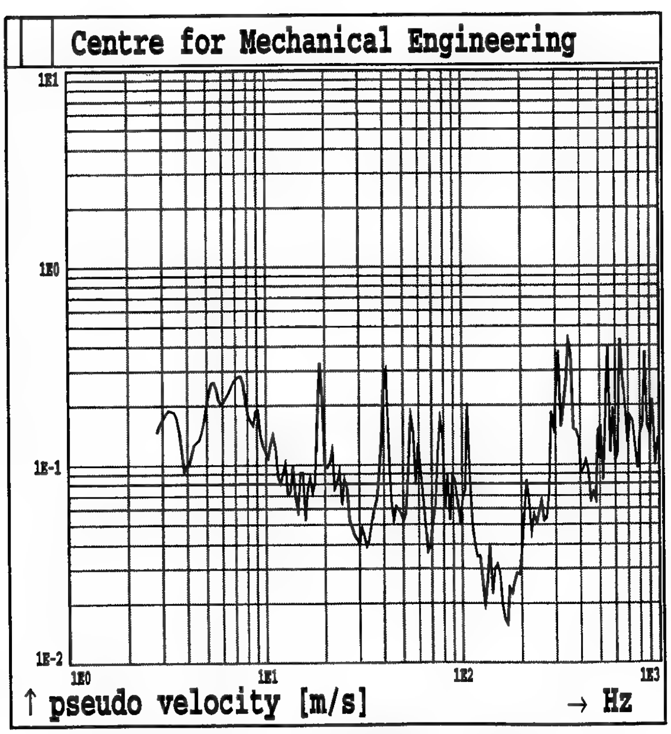


Fig.1B98. Shot 1 MAXIMAX Sensor A18

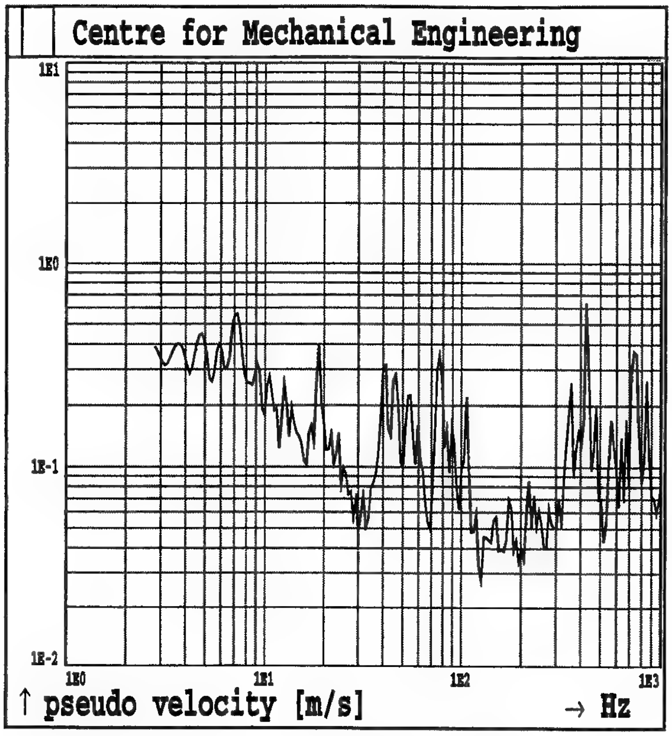


Fig.1B99. Shot 1 MAXIMAX Sensor A19

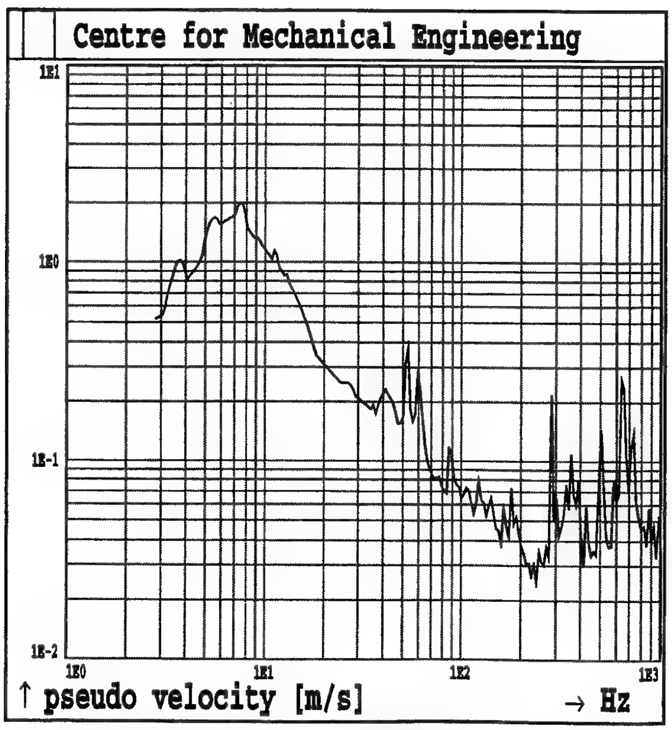


Fig.1B100. Shot 1 MAXIMAX Sensor A20

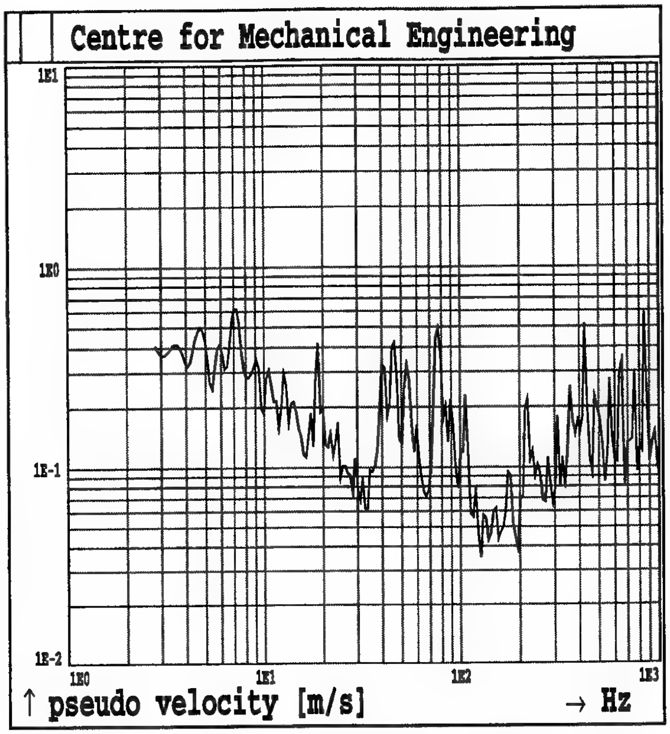


Fig.1B101. Shot 1 MAXIMAX Sensor A21

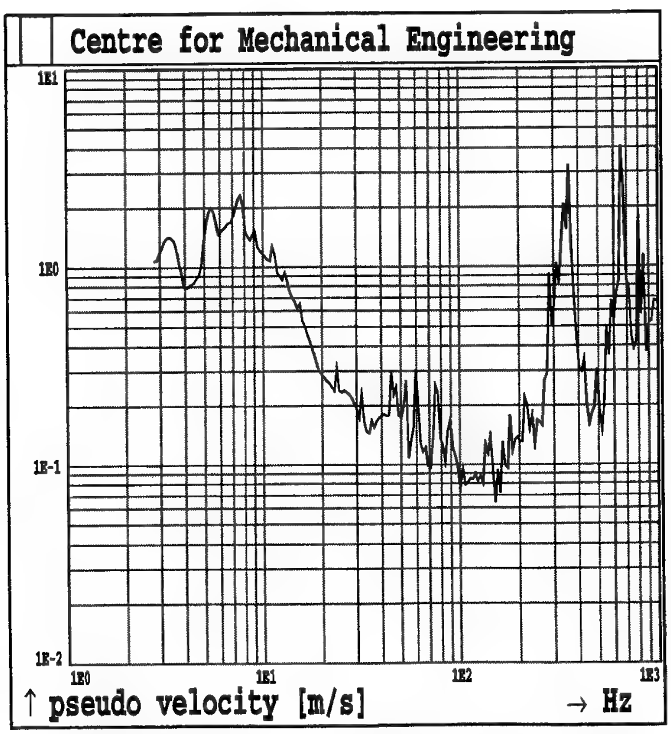


Fig.1B102. Shot 1 MAXIMAX Sensor A22

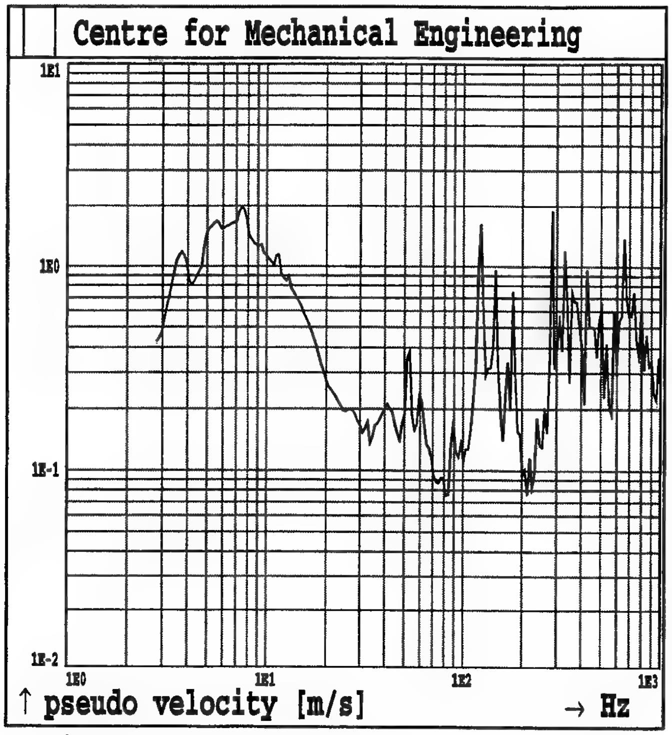


Fig.1B103. Shot 1 MAXIMAX Sensor A23

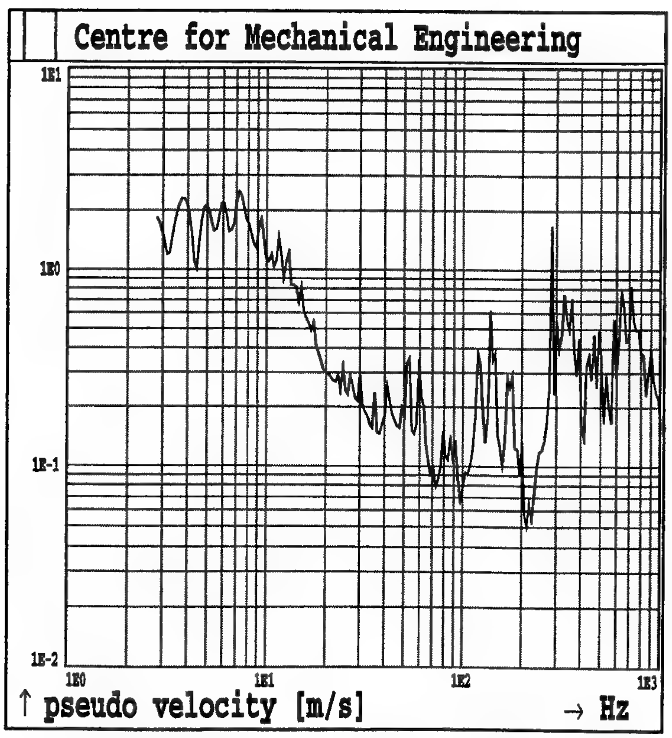


Fig.1B104. Shot 1 MAXIMAX Sensor A24

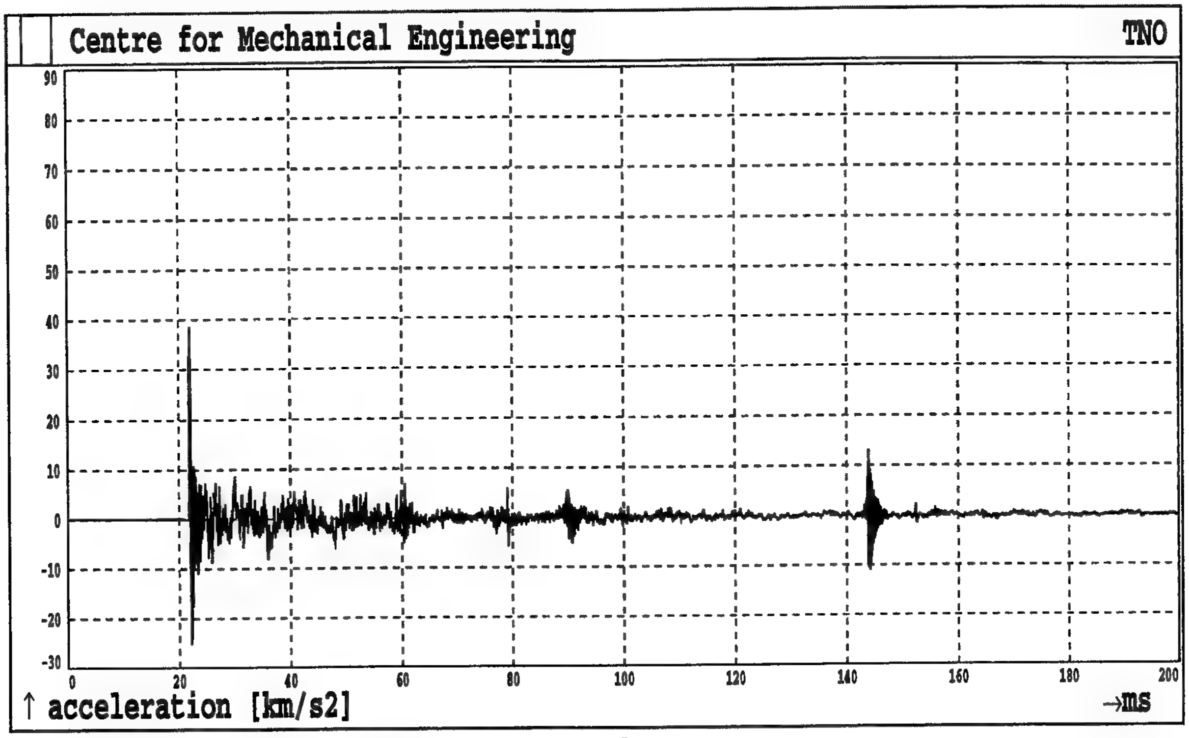


Fig.1B105. Shot 1 Sensor A9 corrected

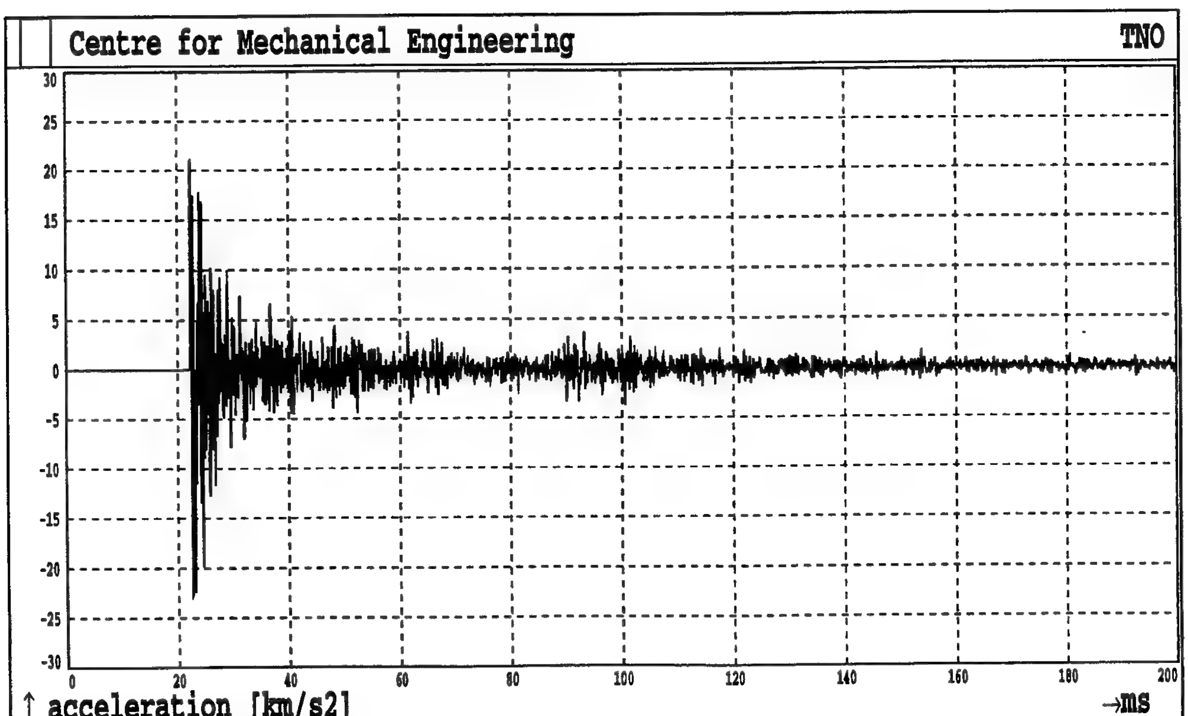


Fig.1B106. Shot 1 Sensor A12 corrected

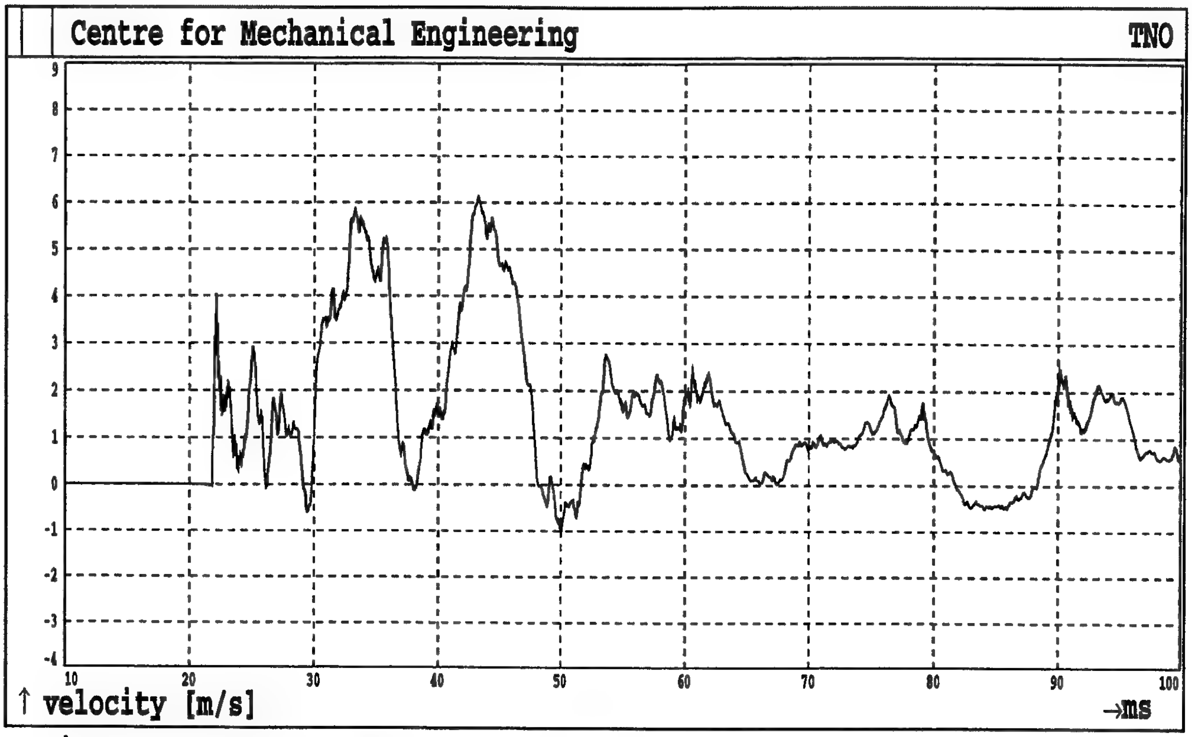


Fig.1B107. Shot 1 Sensor A9 corrected

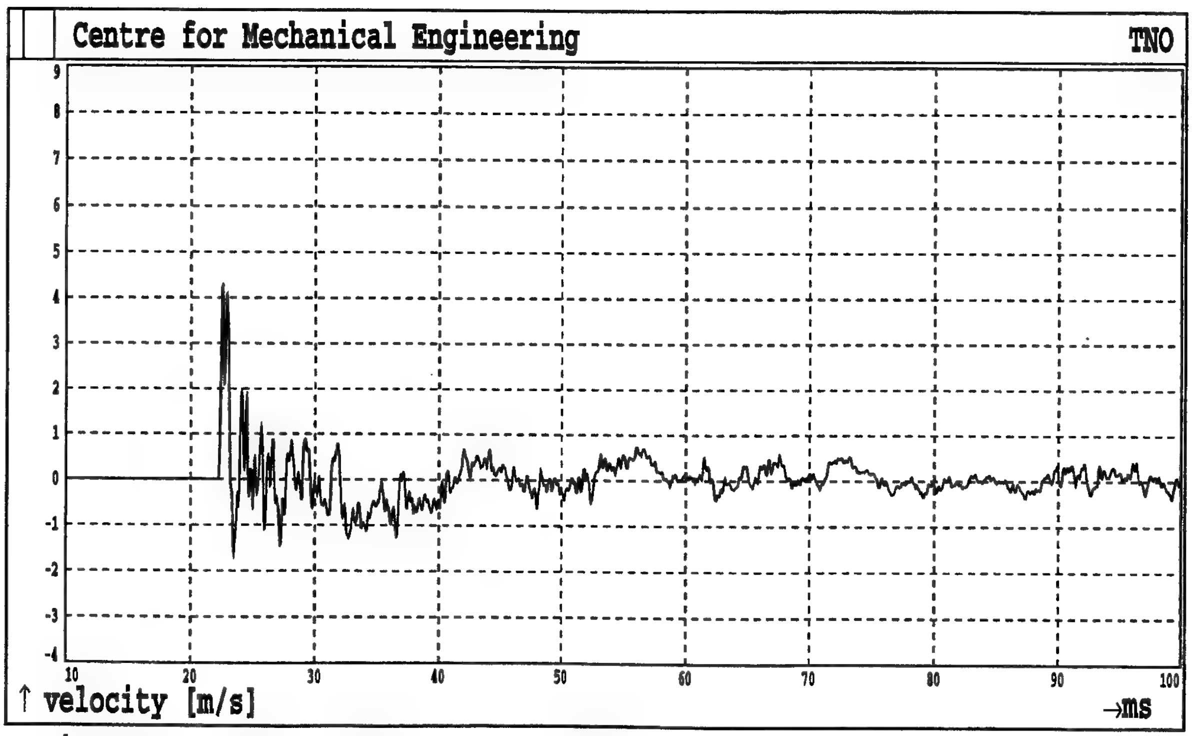


Fig.1B108. Shot 1 Sensor A12 corrected

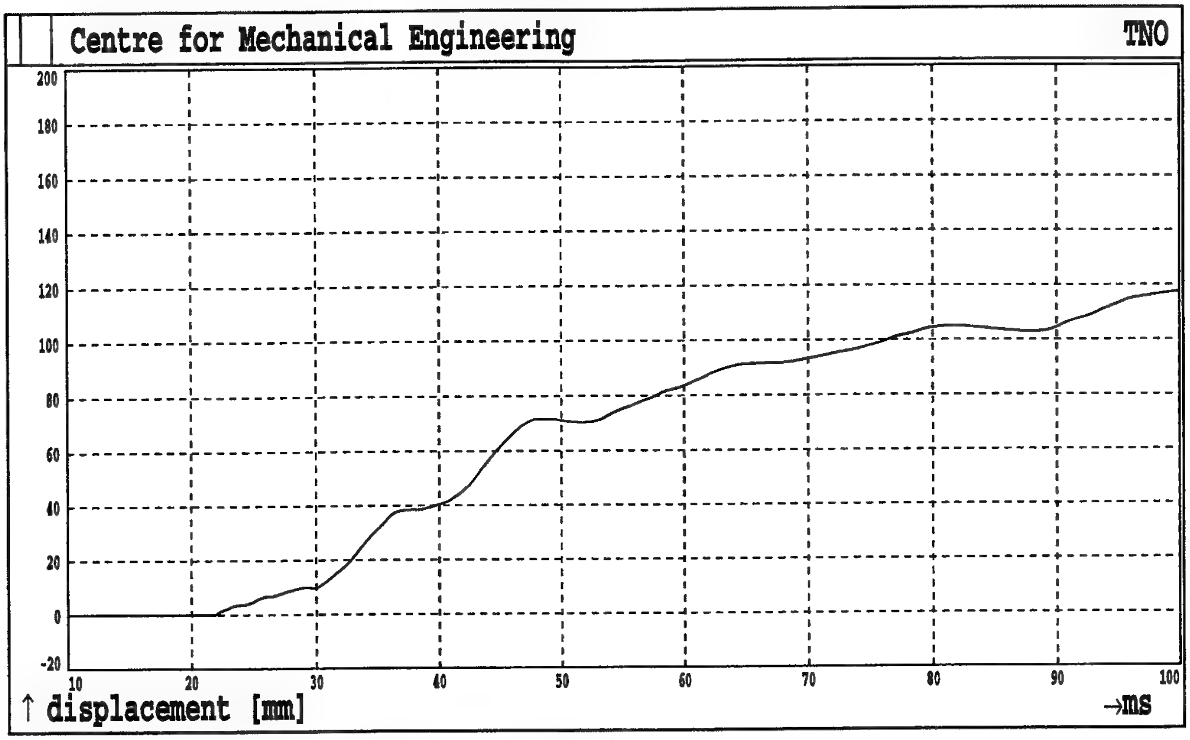


Fig.1B109. Shot 1 Sensor A9 corrected

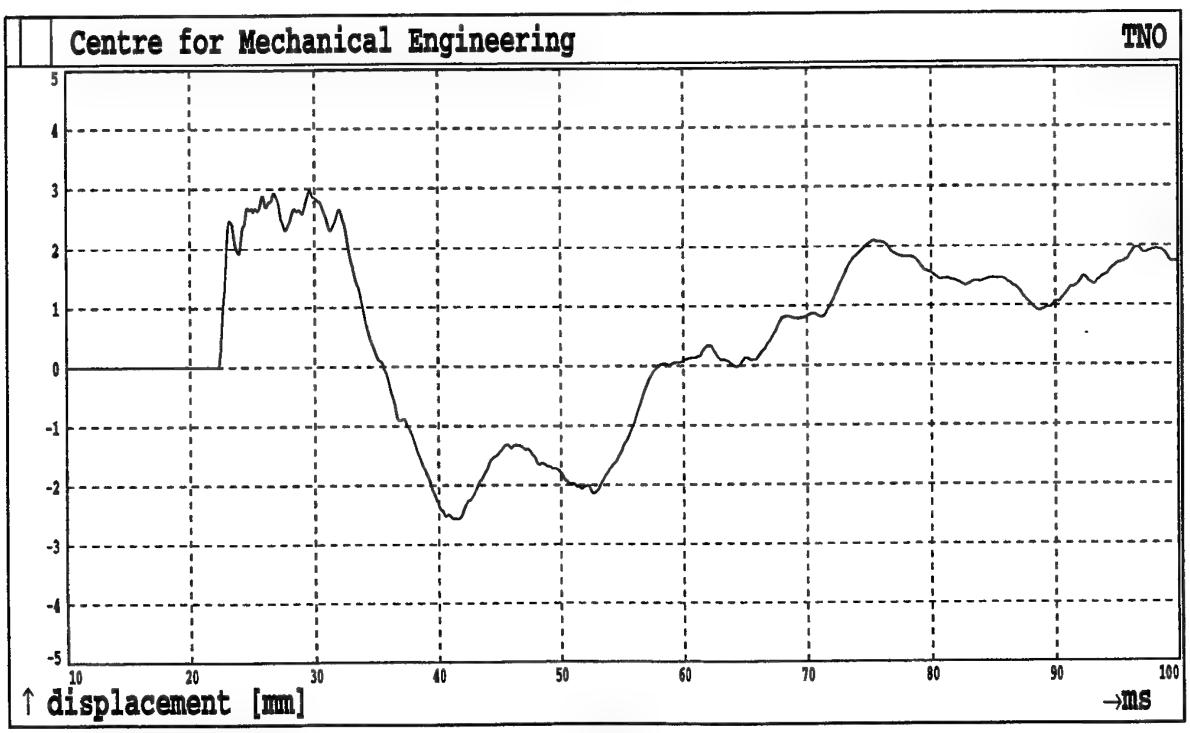


Fig.1B110. Shot 1 Sensor A12 corrected

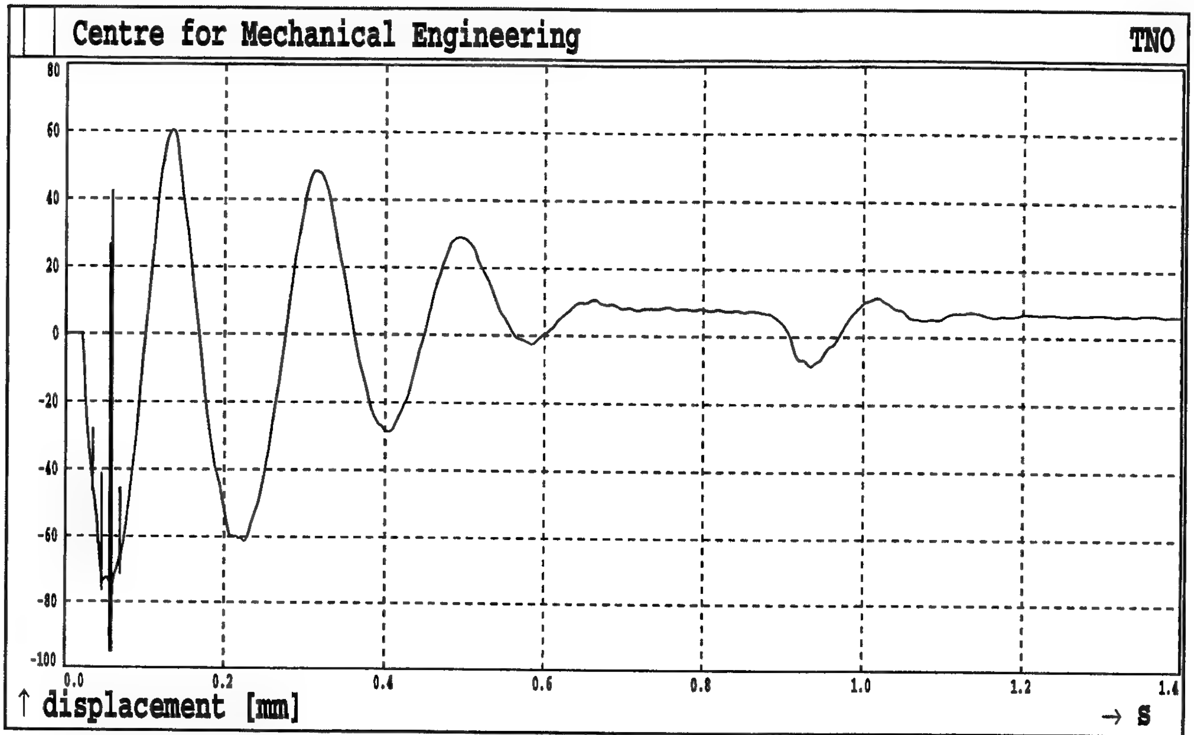


Fig.2B1. Shot 2 Sensor R1

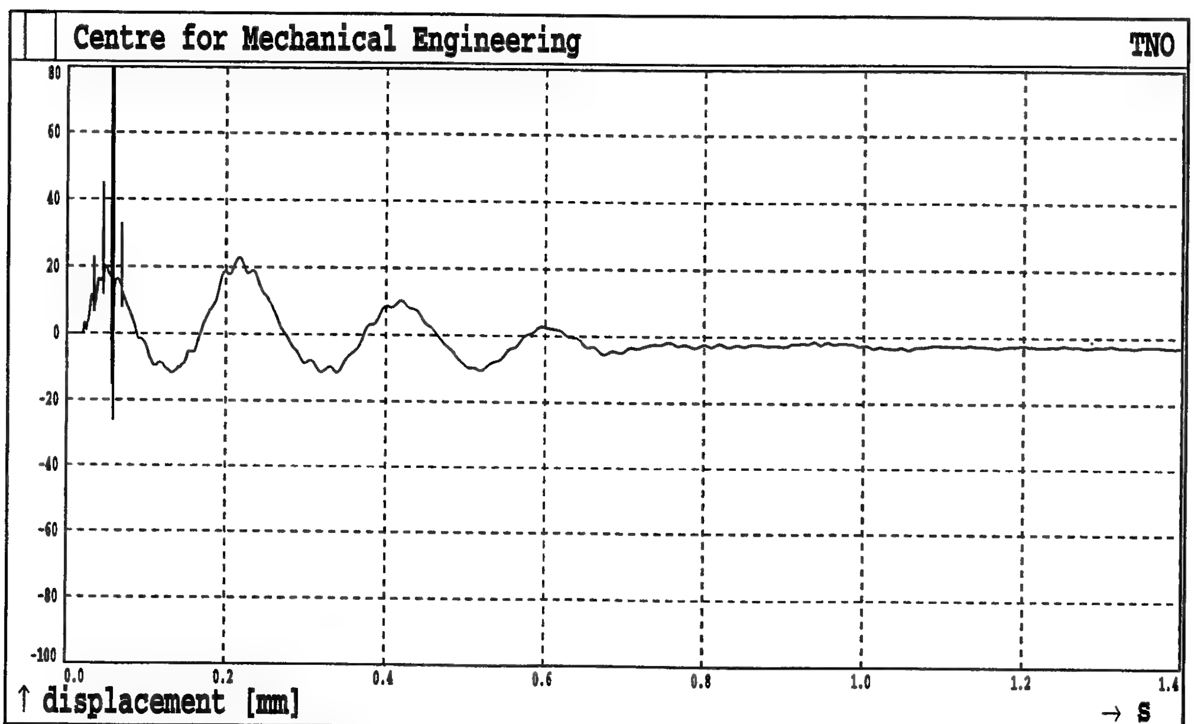


Fig.2B2. Shot 2 Sensor R2

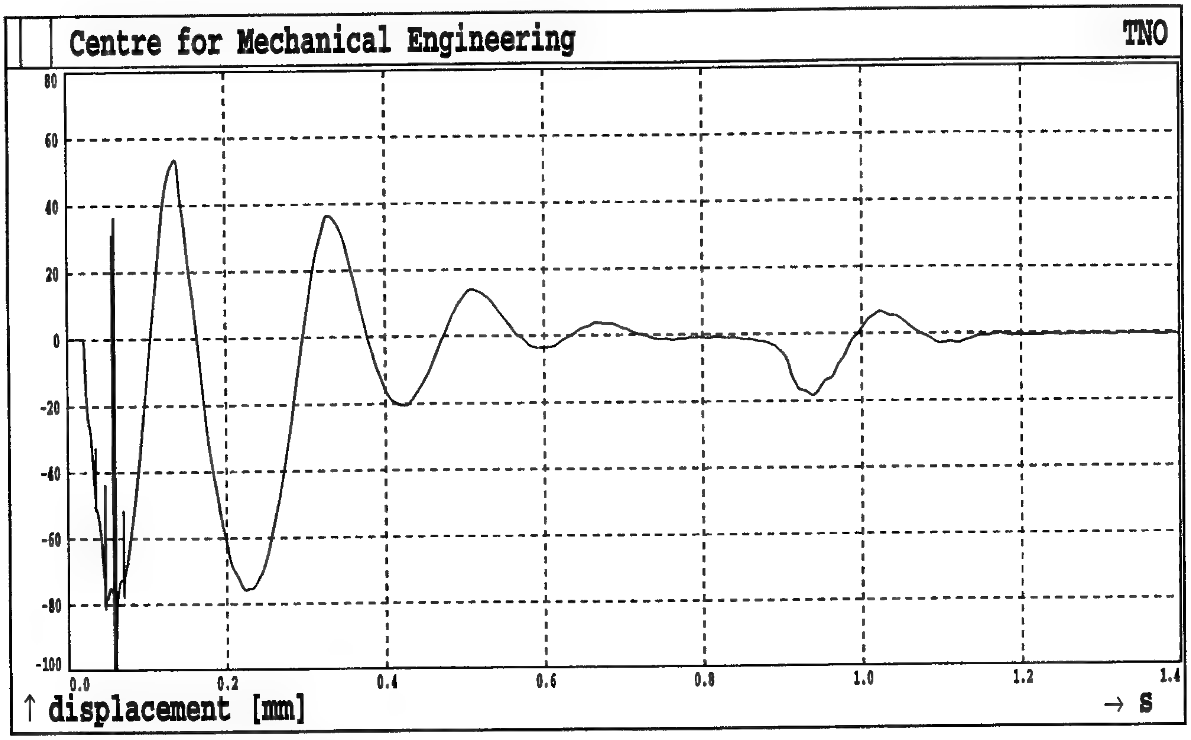


Fig.2B3. Shot 2 Sensor R3

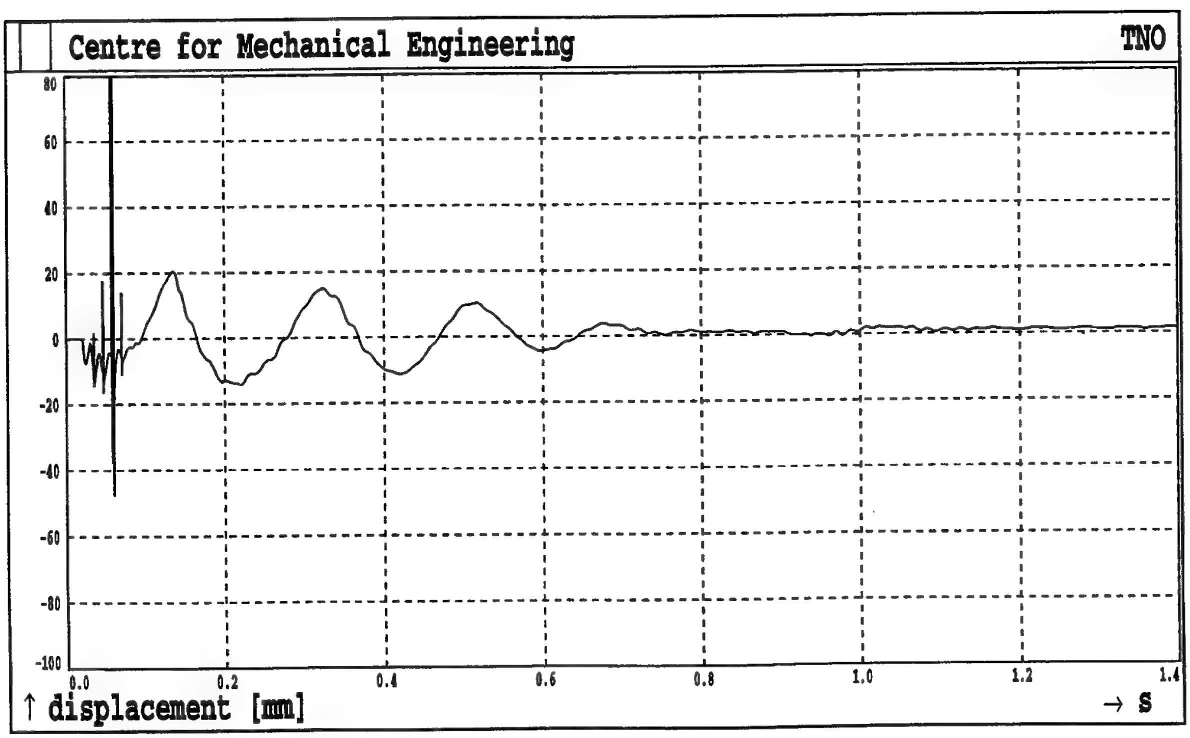


Fig.2B4. Shot 2 Sensor R4

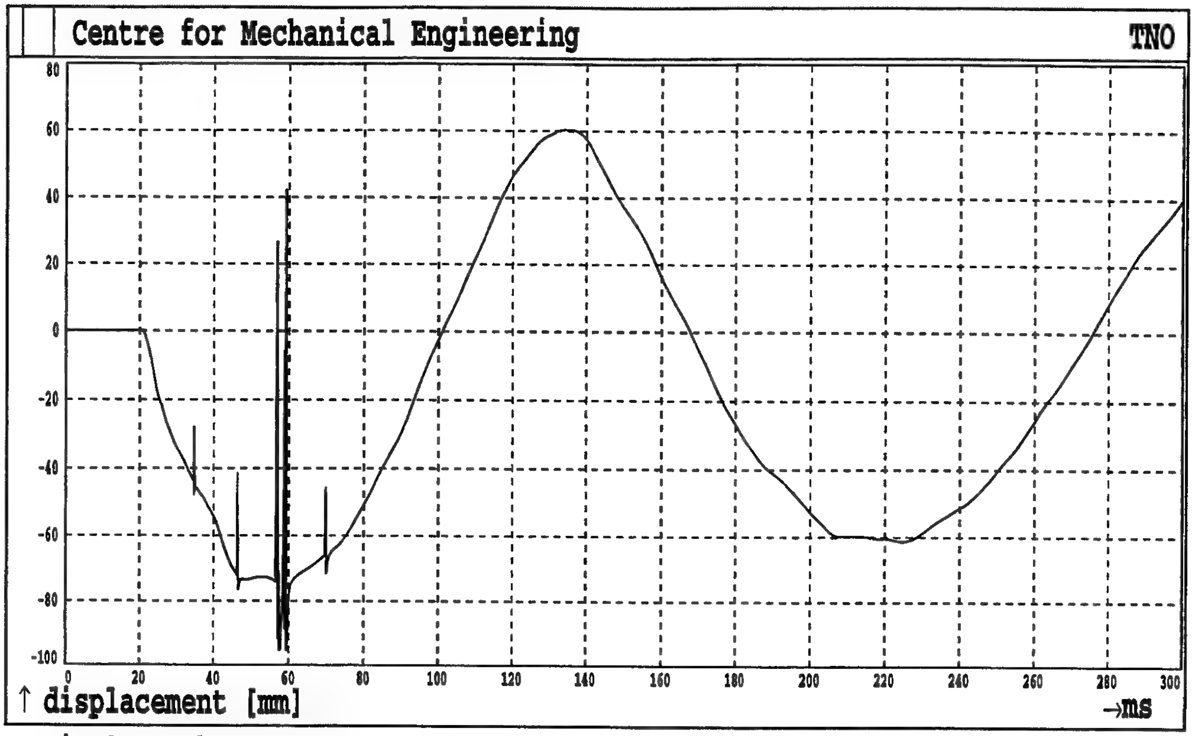


Fig.2B5. Shot 2 Sensor R1

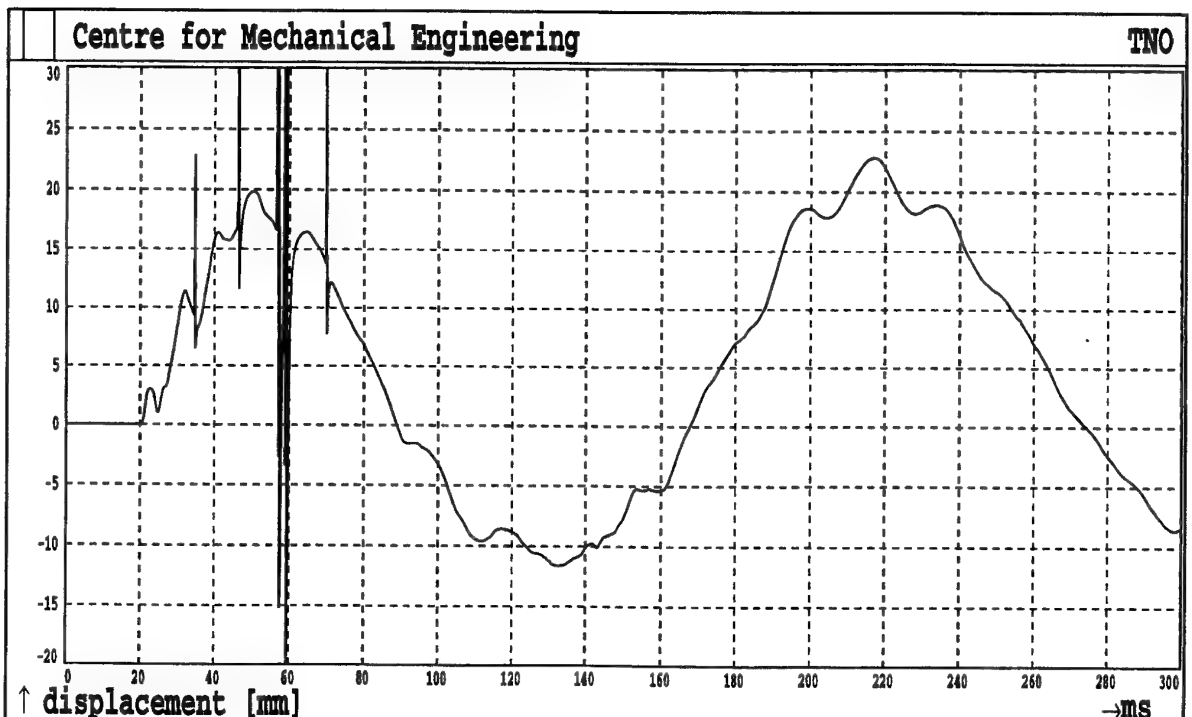


Fig.2B6. Shot 2 Sensor R2

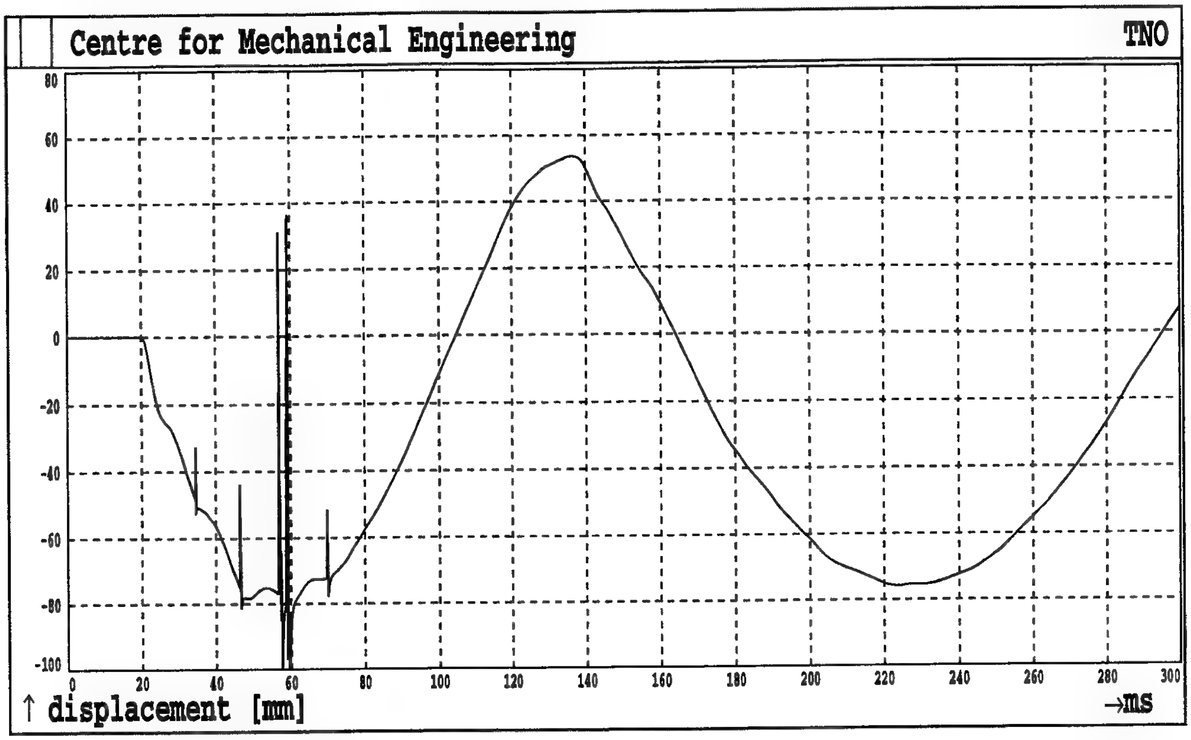


Fig.2B7. Shot 2 Sensor R3

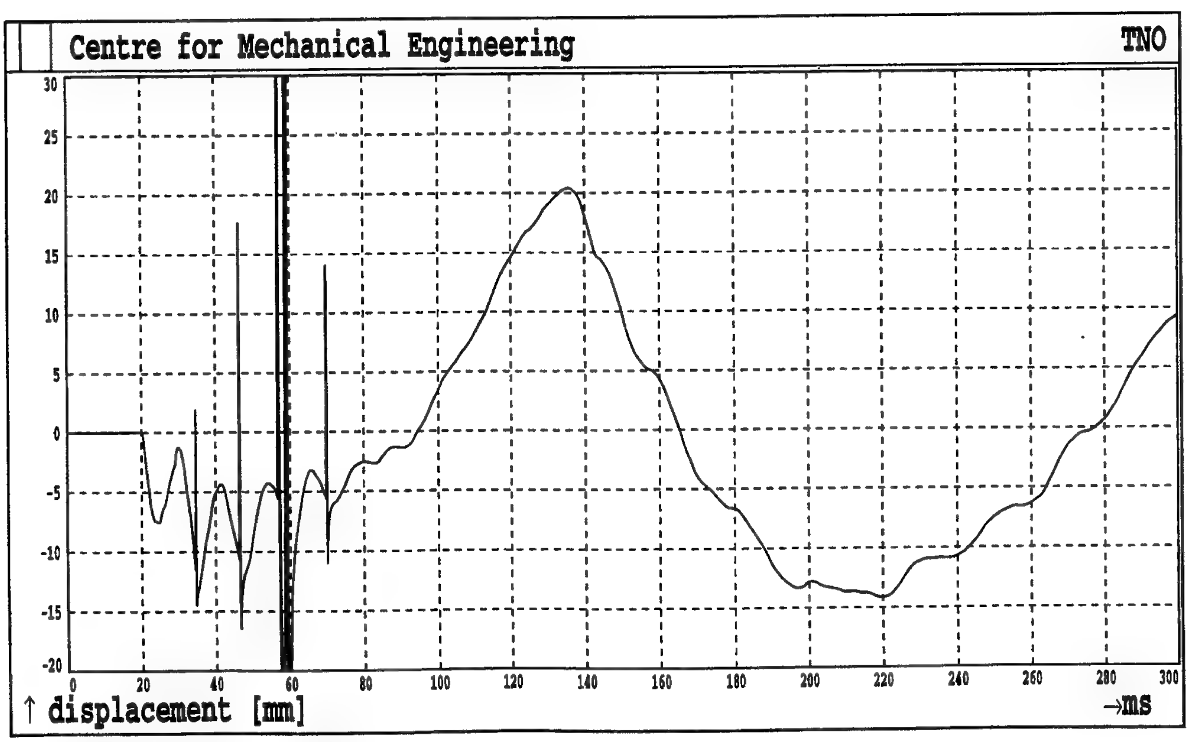


Fig.2B8. Shot 2 Sensor R4

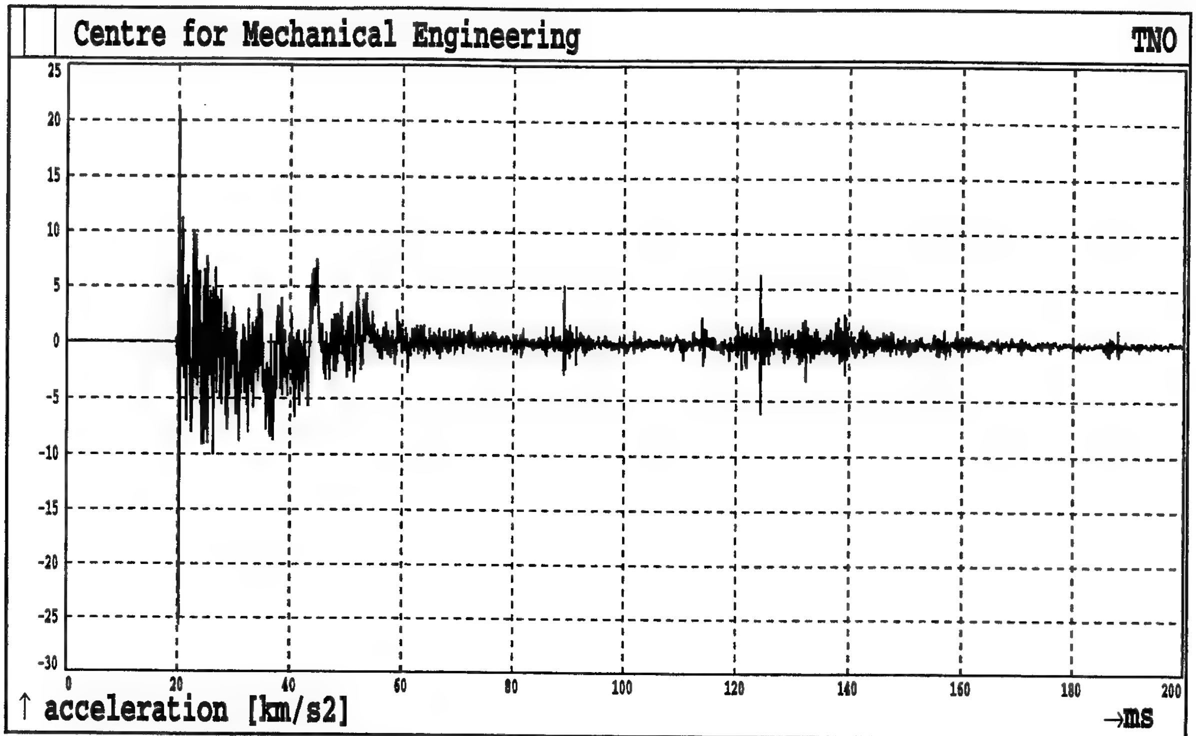


Fig.2B9. Shot 2 Sensor A1

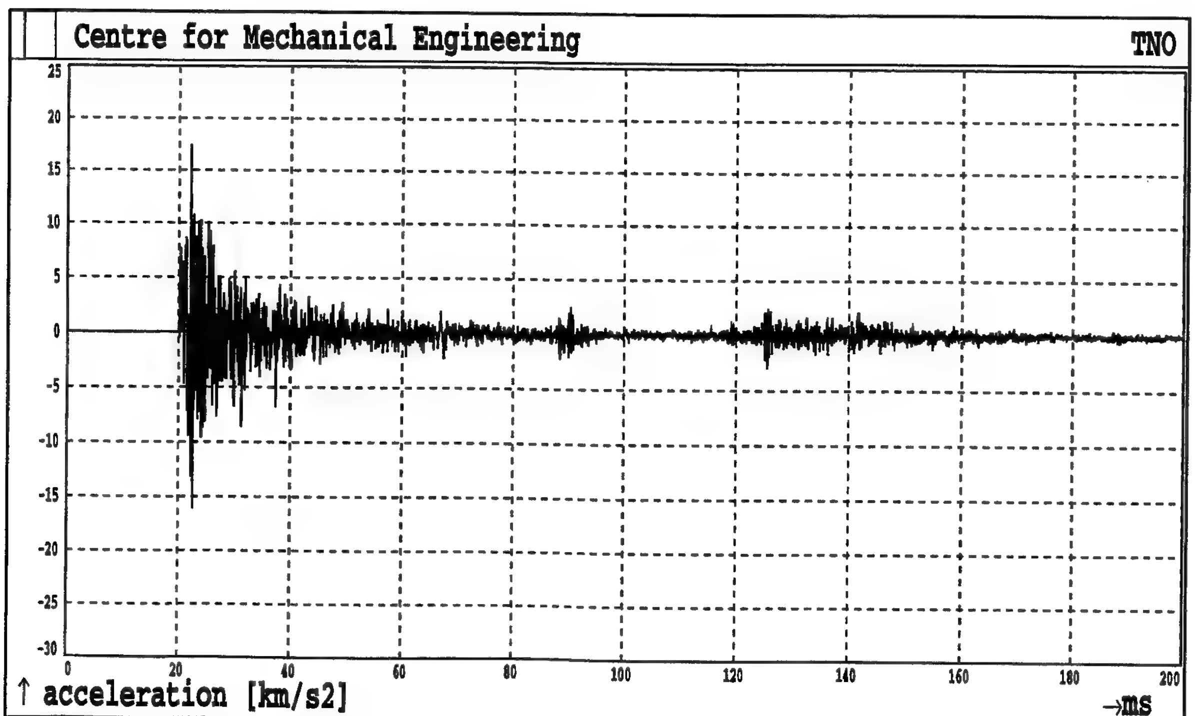


Fig.2B10. Shot 2 Sensor A2

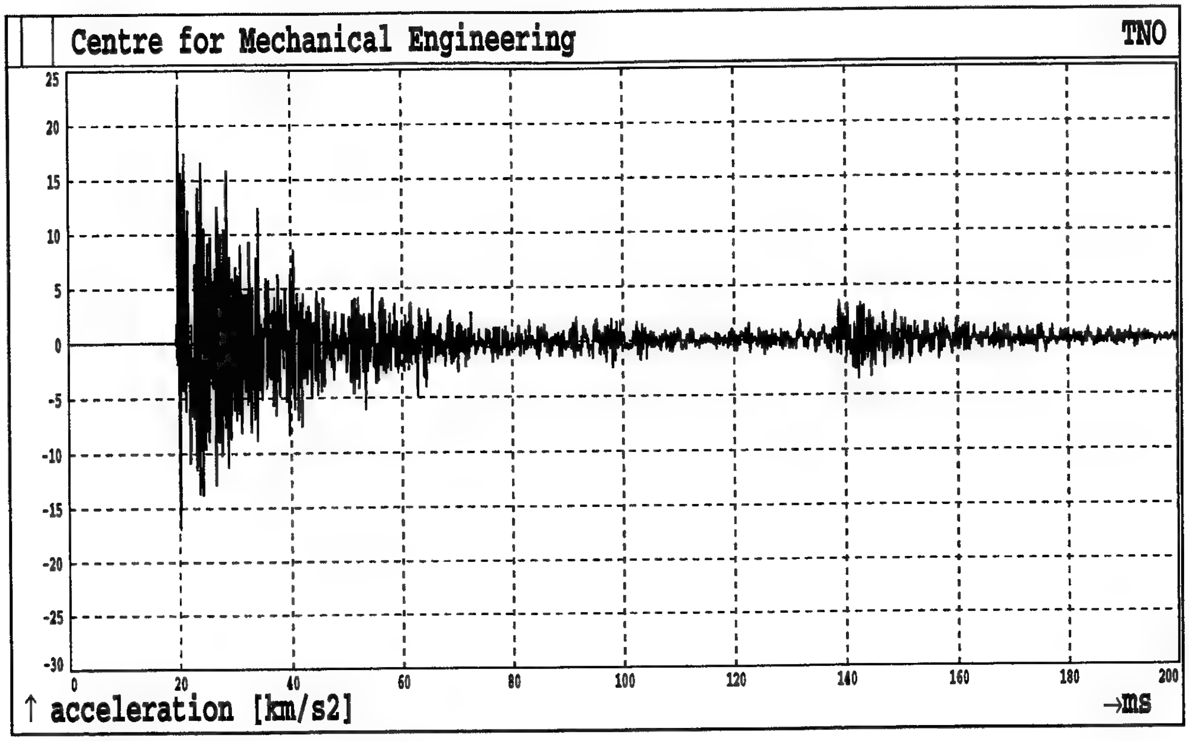


Fig.2B11. Shot 2 Sensor A3

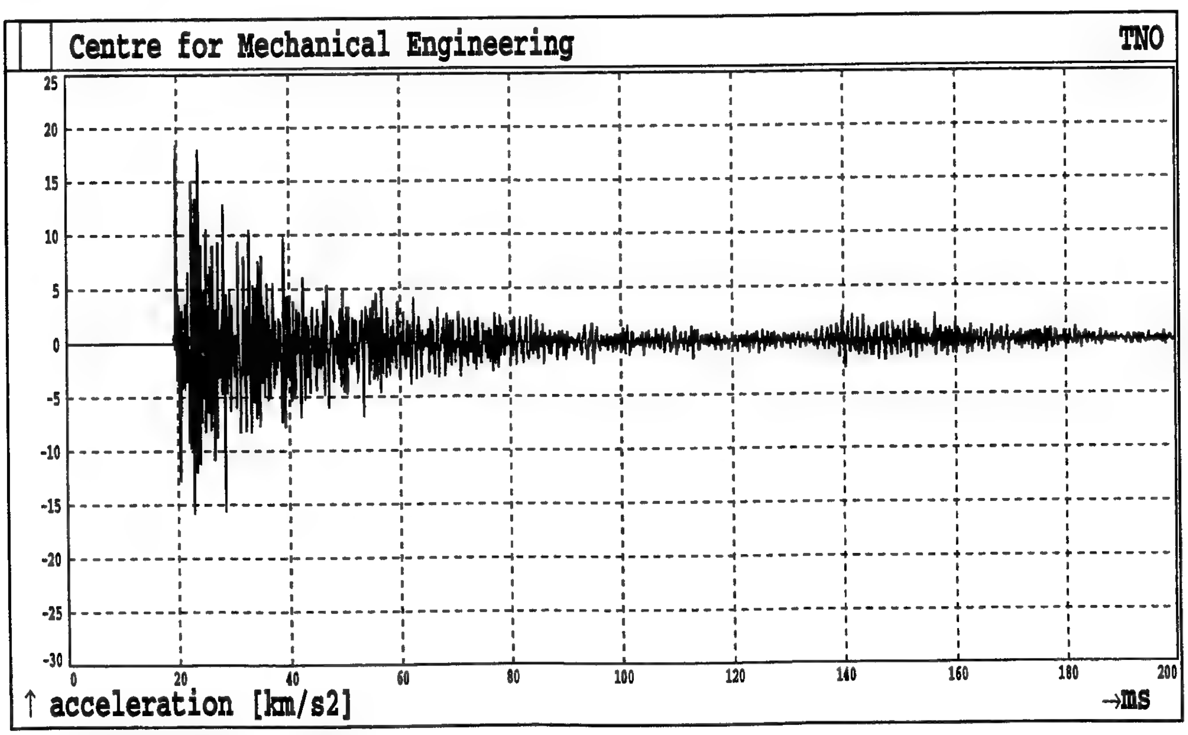


Fig.2B12. Shot 2 Sensor A4

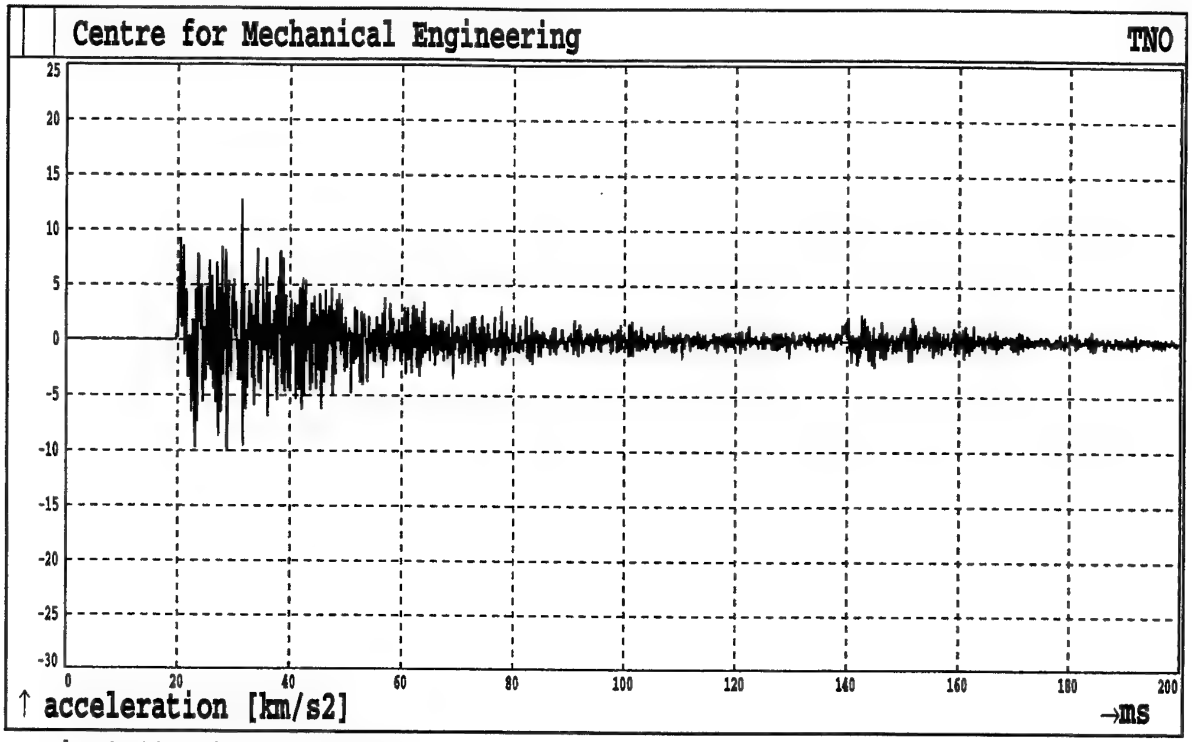


Fig.2B13. Shot 2 Sensor A5

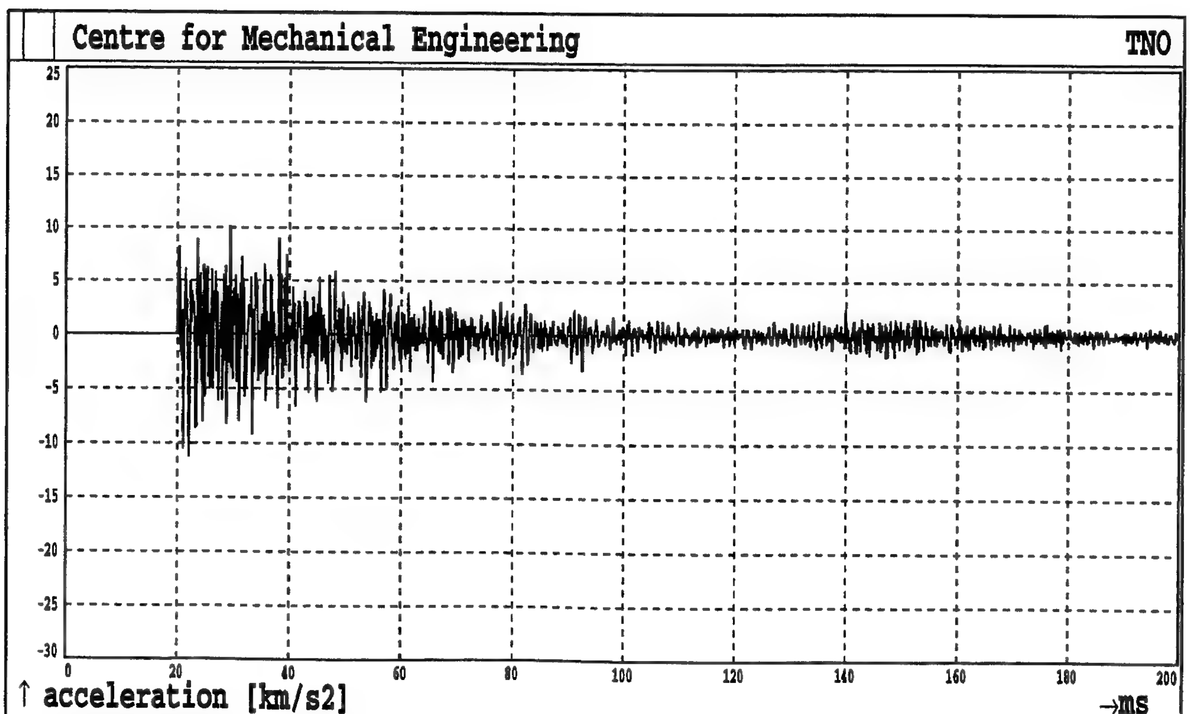


Fig.2B14. Shot 2 Sensor A6

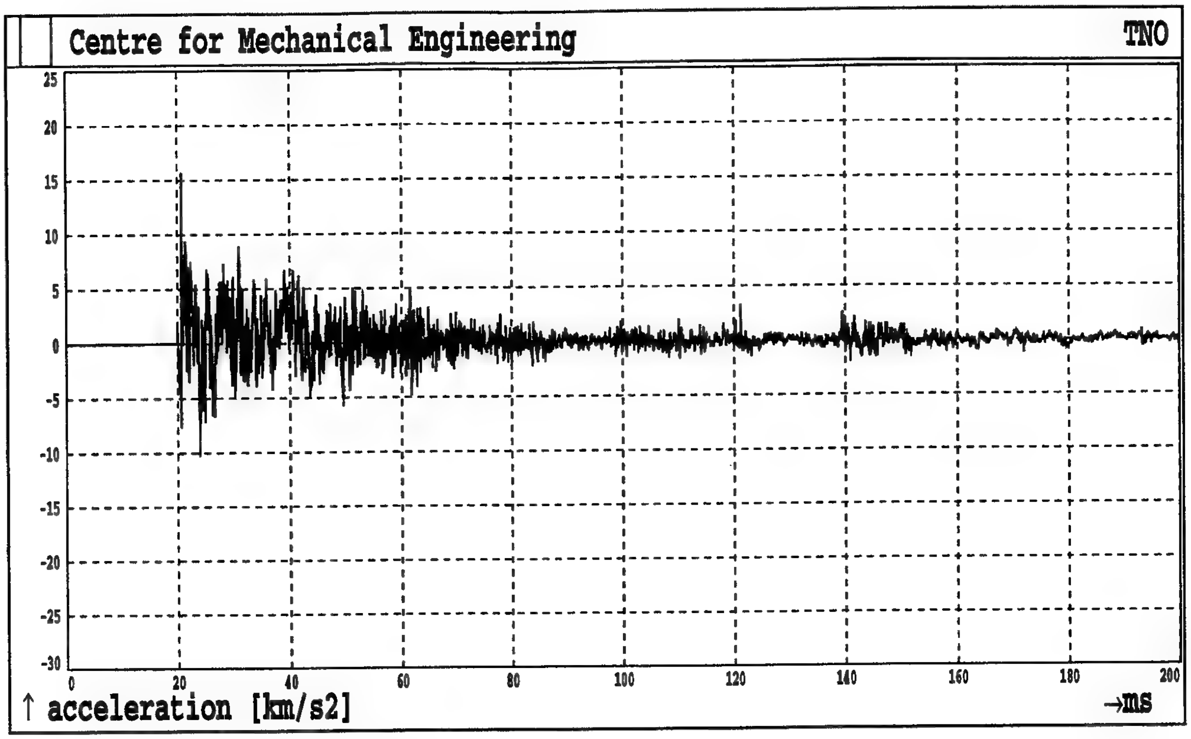


Fig.2B15. Shot 2 Sensor A7

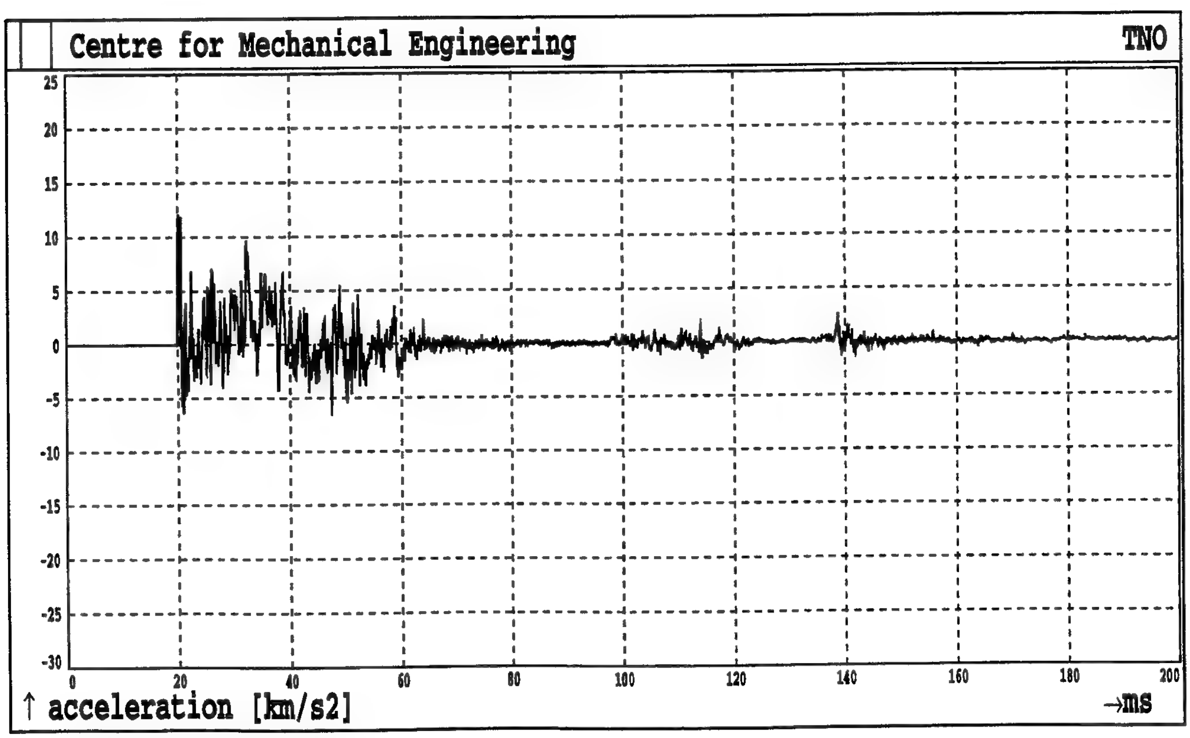


Fig.2B16. Shot 2 Sensor A8

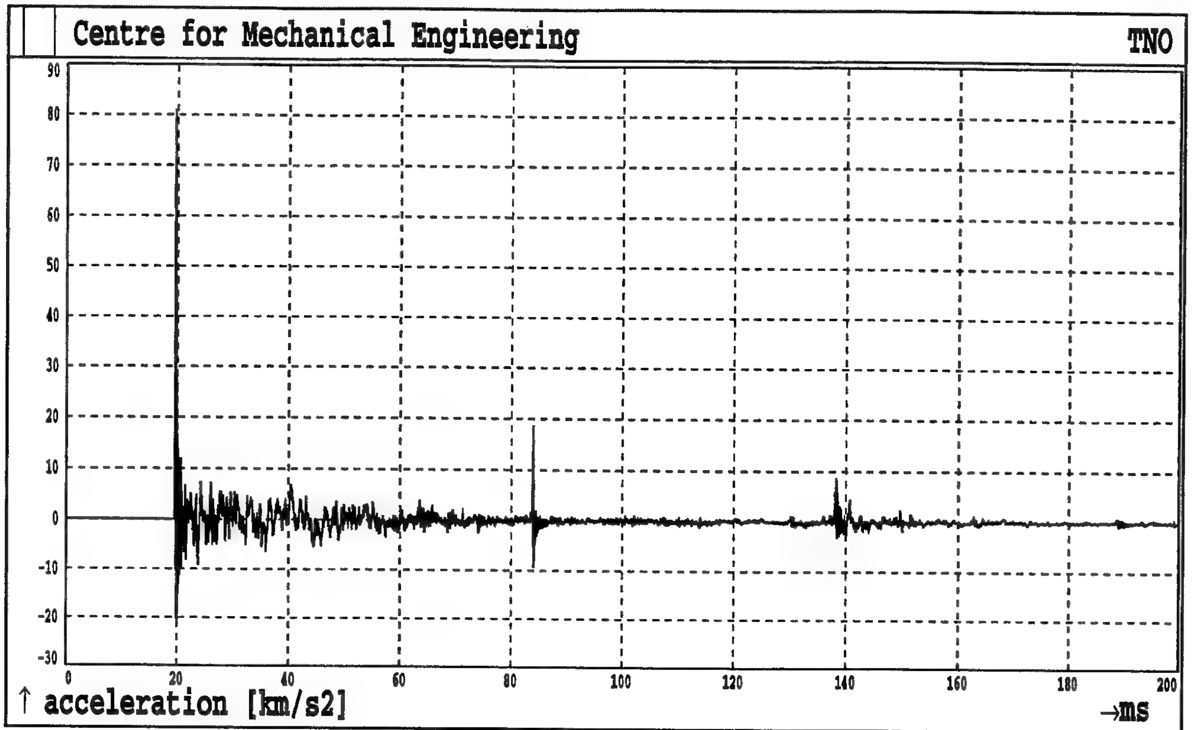


Fig.2B17. Shot 2 Sensor A9

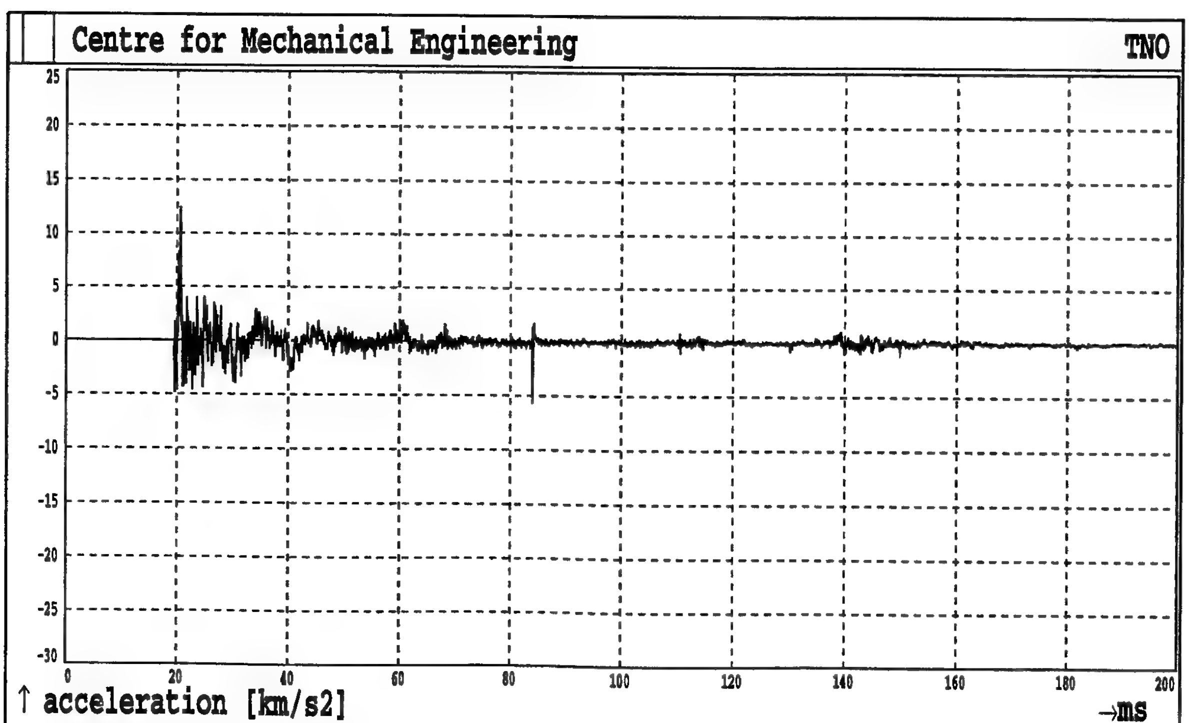


Fig.2B18. Shot 2 Sensor A10

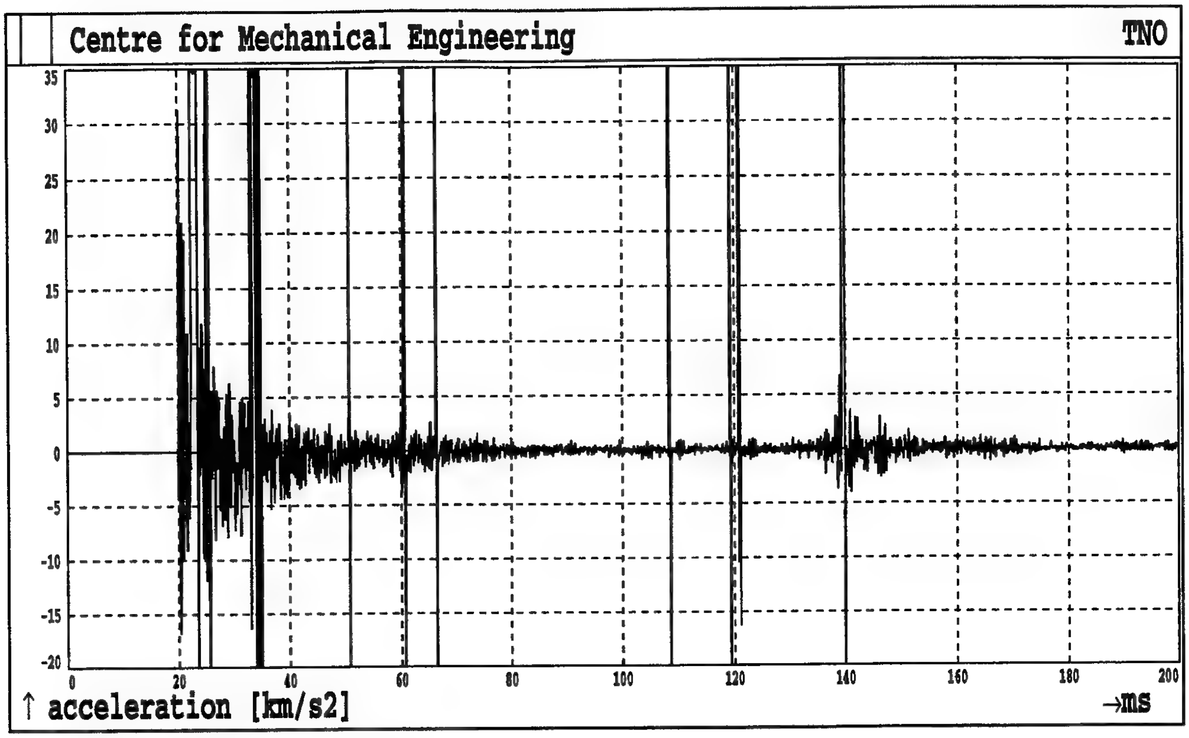


Fig.2B19. Shot 2 Sensor A11

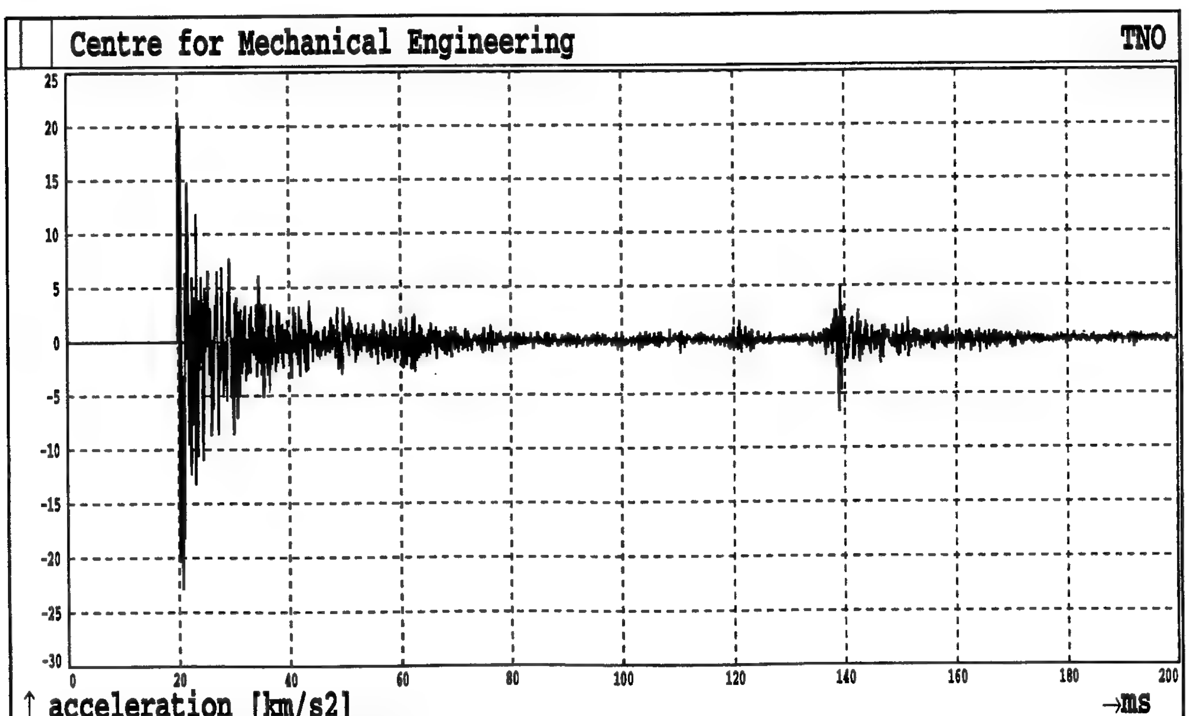


Fig.2B20. Shot 2 Sensor A12

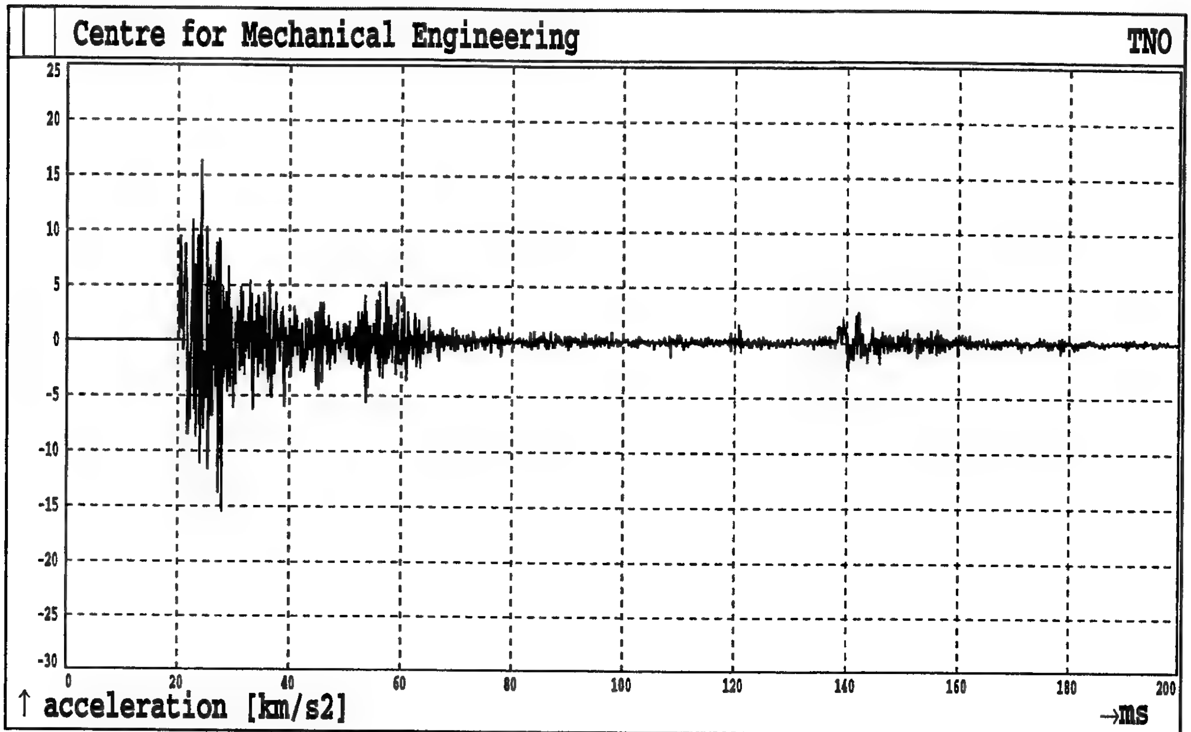


Fig.2B21. Shot 2 Sensor A13

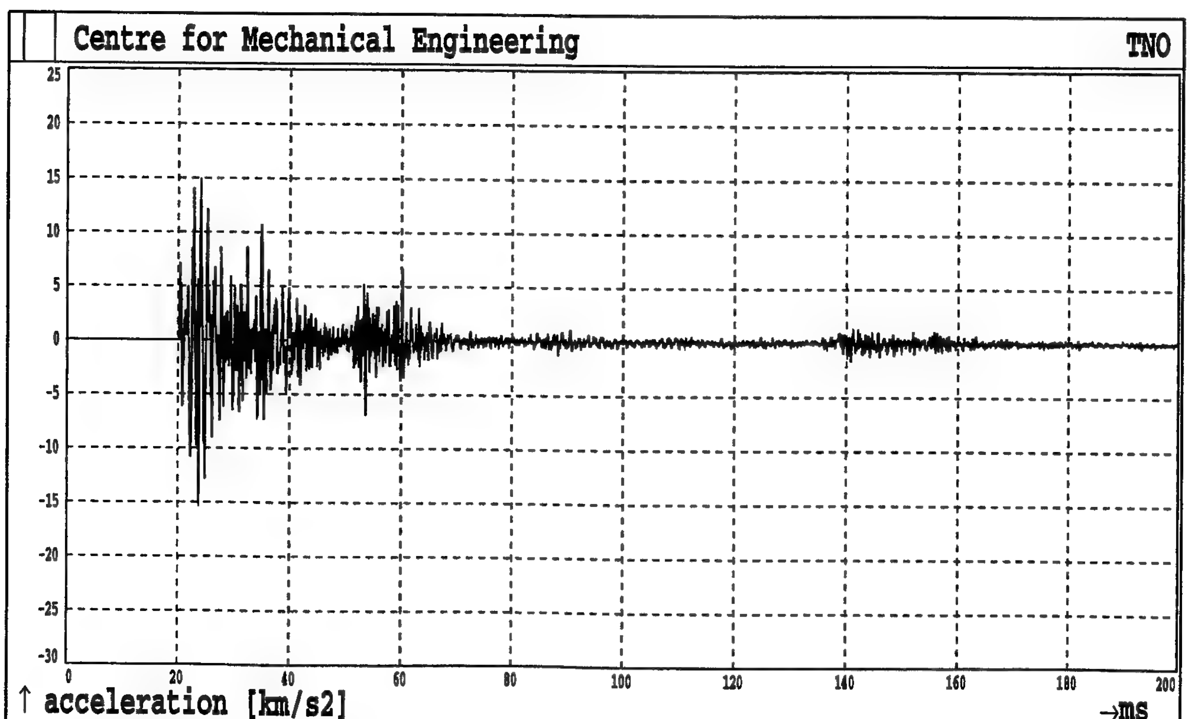


Fig.2B22. Shot 2 Sensor A14

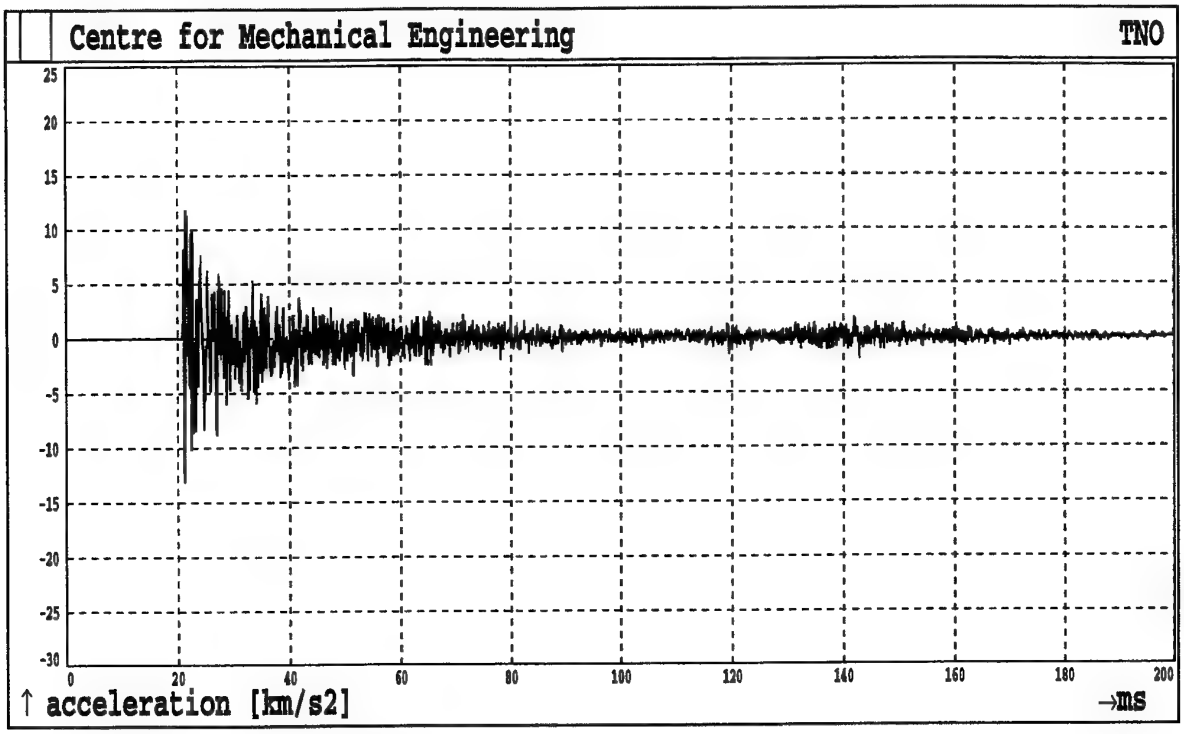


Fig.2B23. Shot 2 Sensor A15

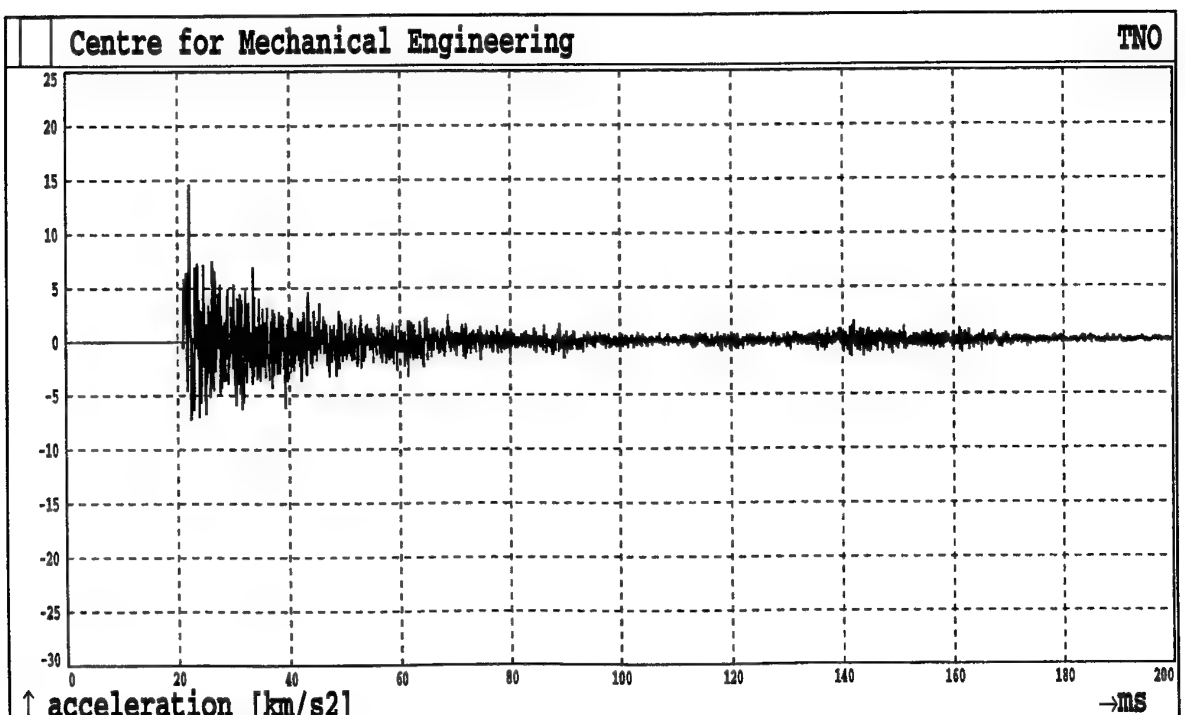


Fig.2B24. Shot 2 Sensor A16

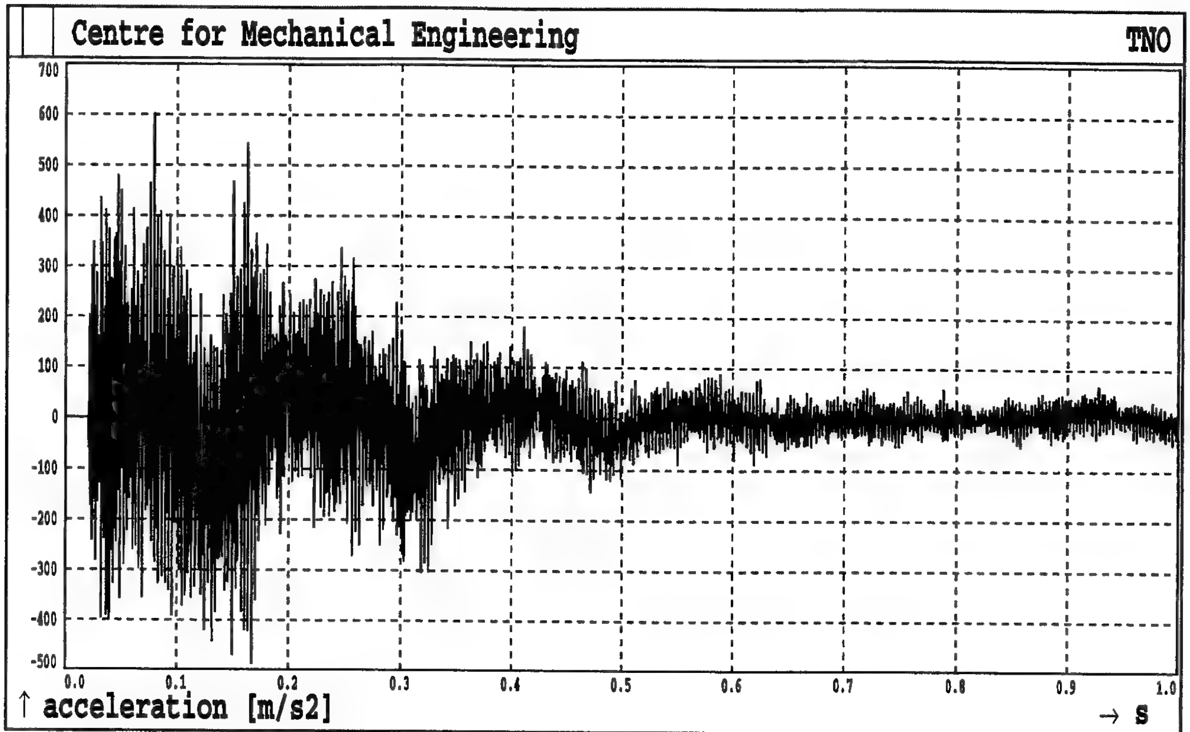


Fig.2B25. Shot 2 Sensor A17

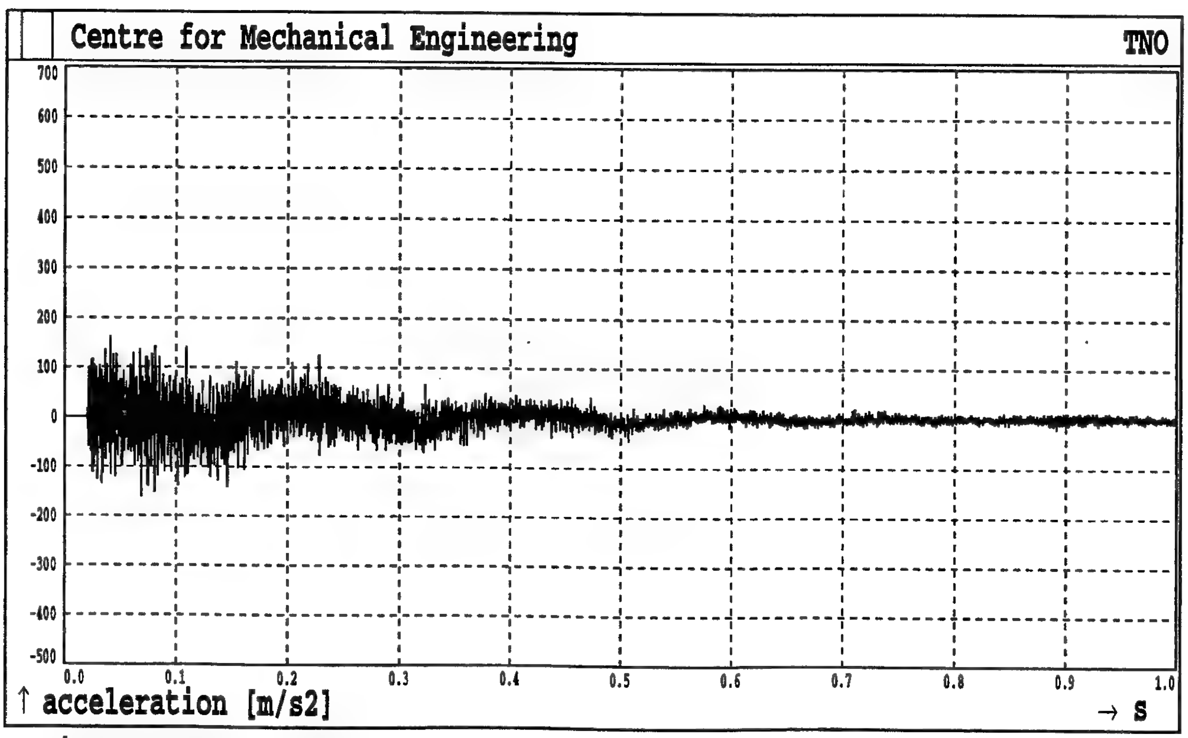


Fig.2B26. Shot 2 Sensor A18

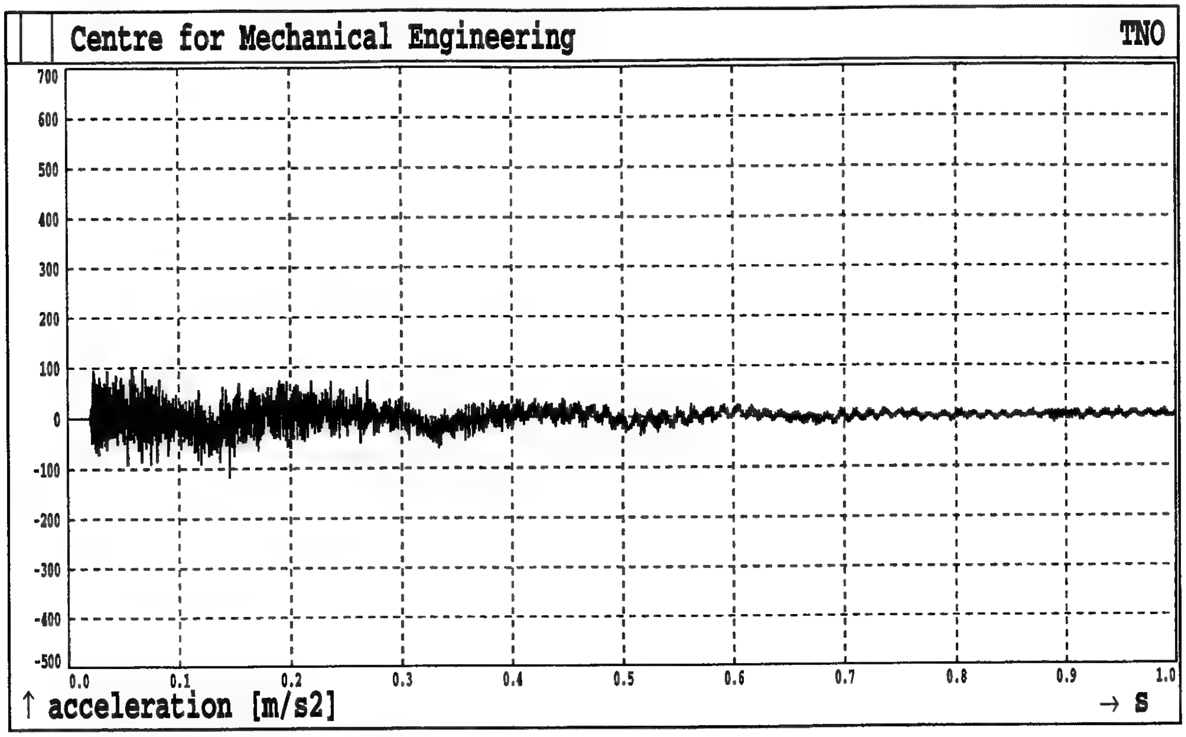


Fig.2B27. Shot 2 Sensor A19

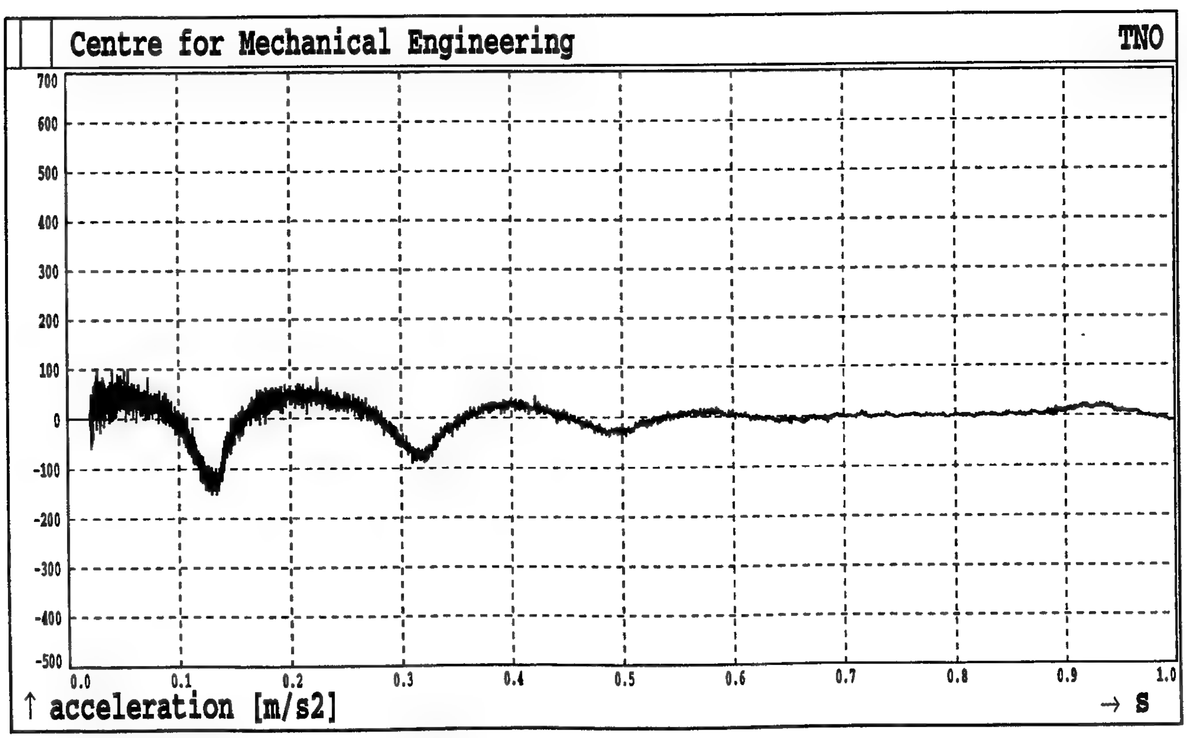


Fig.2B28. Shot 2 Sensor A20

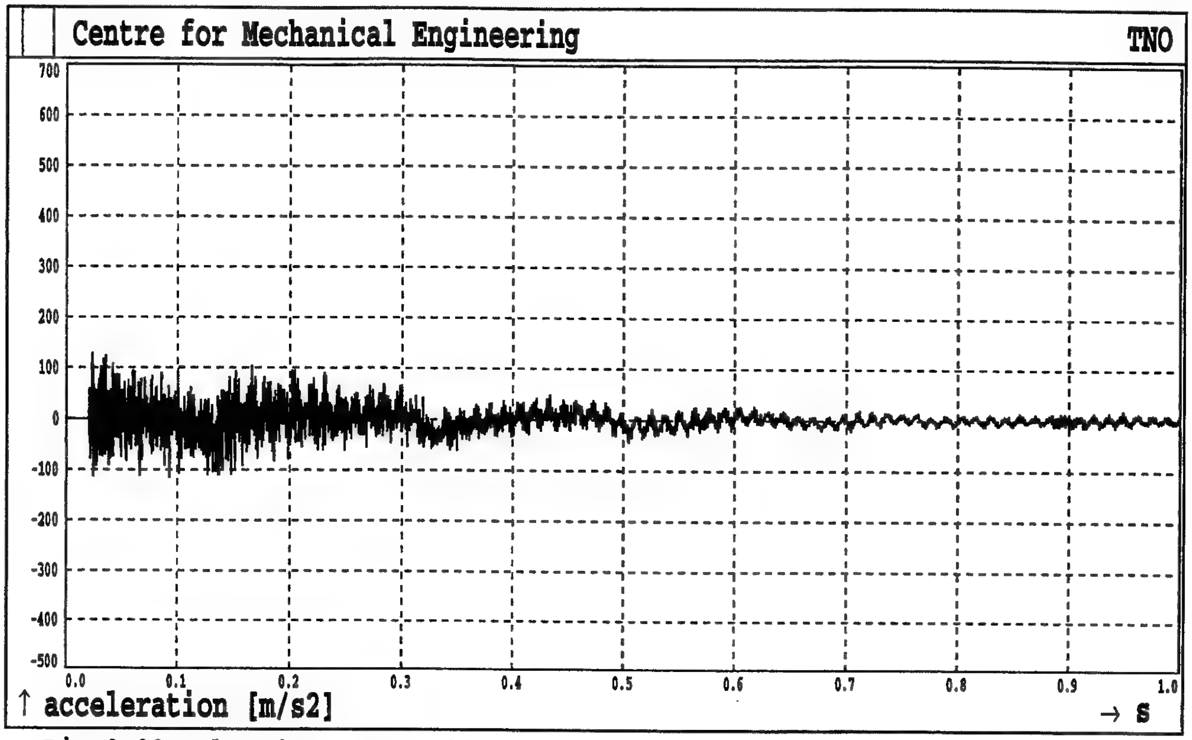


Fig.2B29. Shot 2 Sensor A21

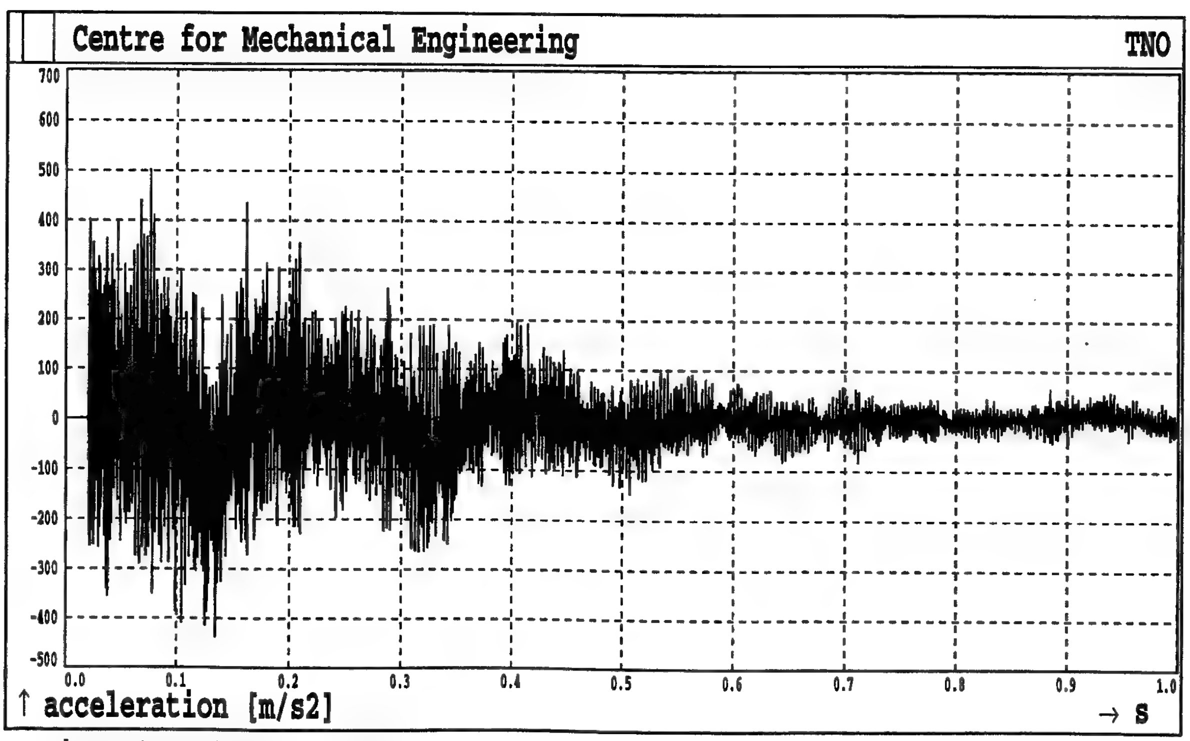


Fig.2B30. Shot 2 Sensor A22

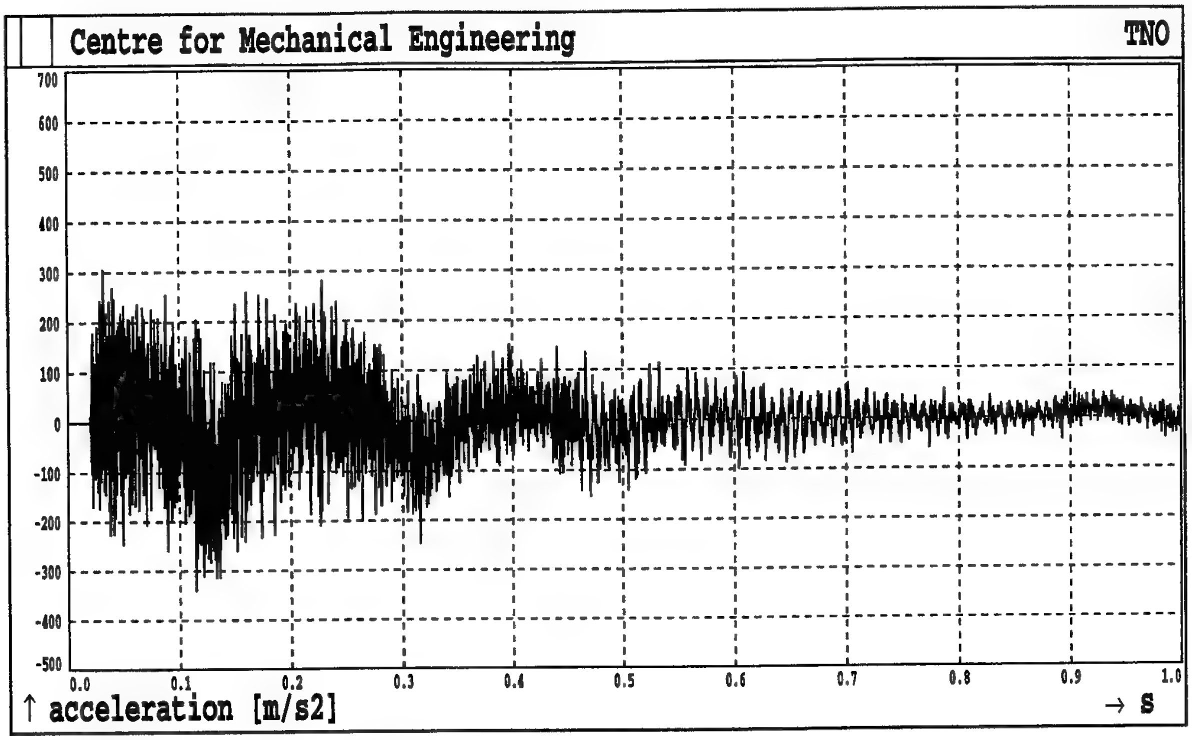


Fig.2B31. Shot 2 Sensor A23

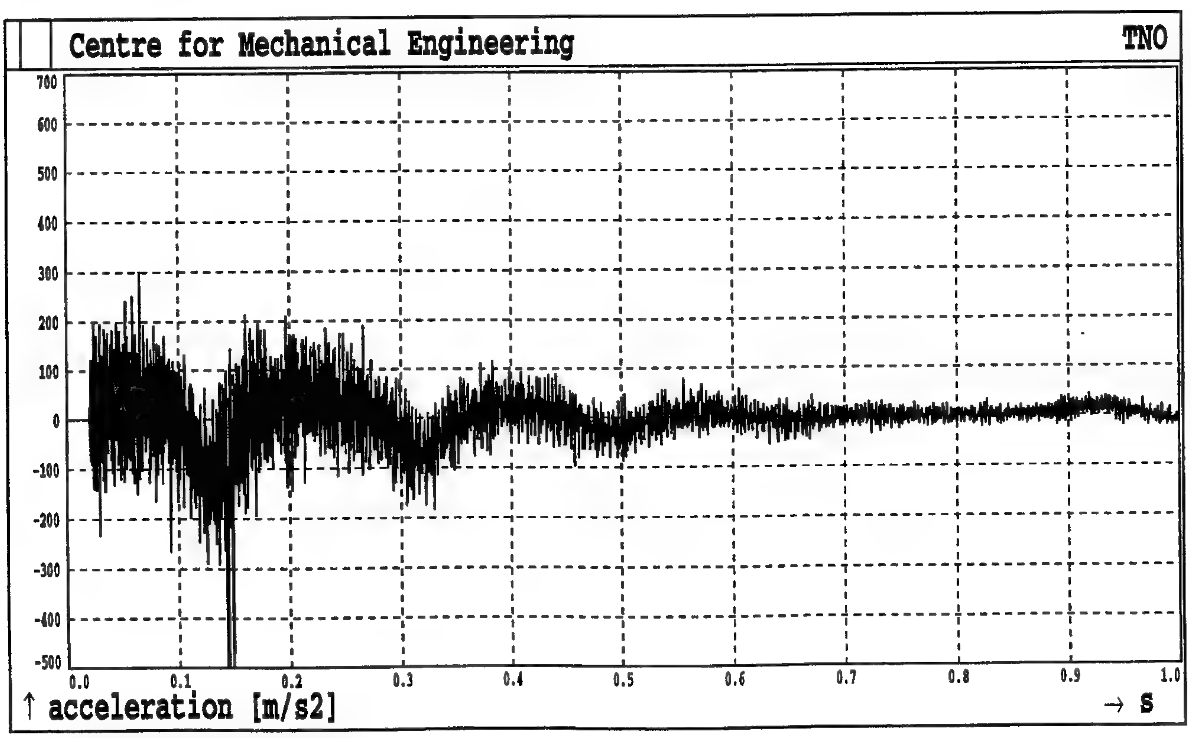


Fig.2B32. Shot 2 Sensor A24

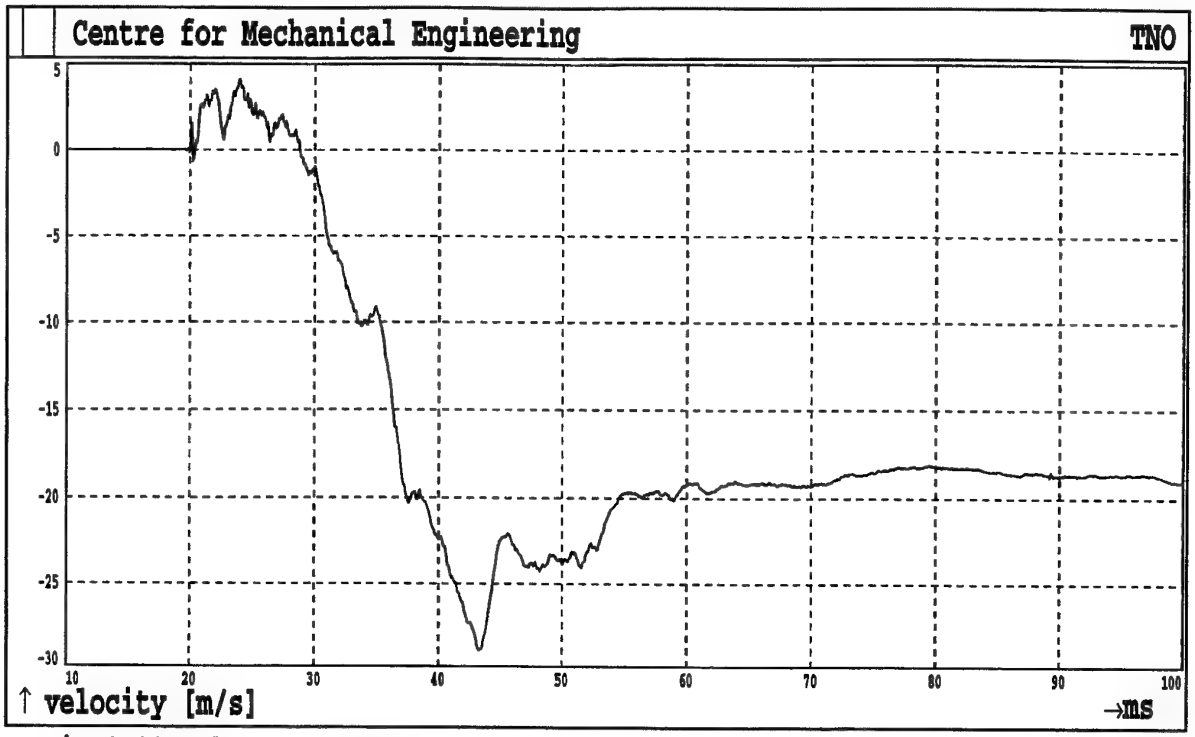


Fig.2B33. Shot 2 Sensor A1

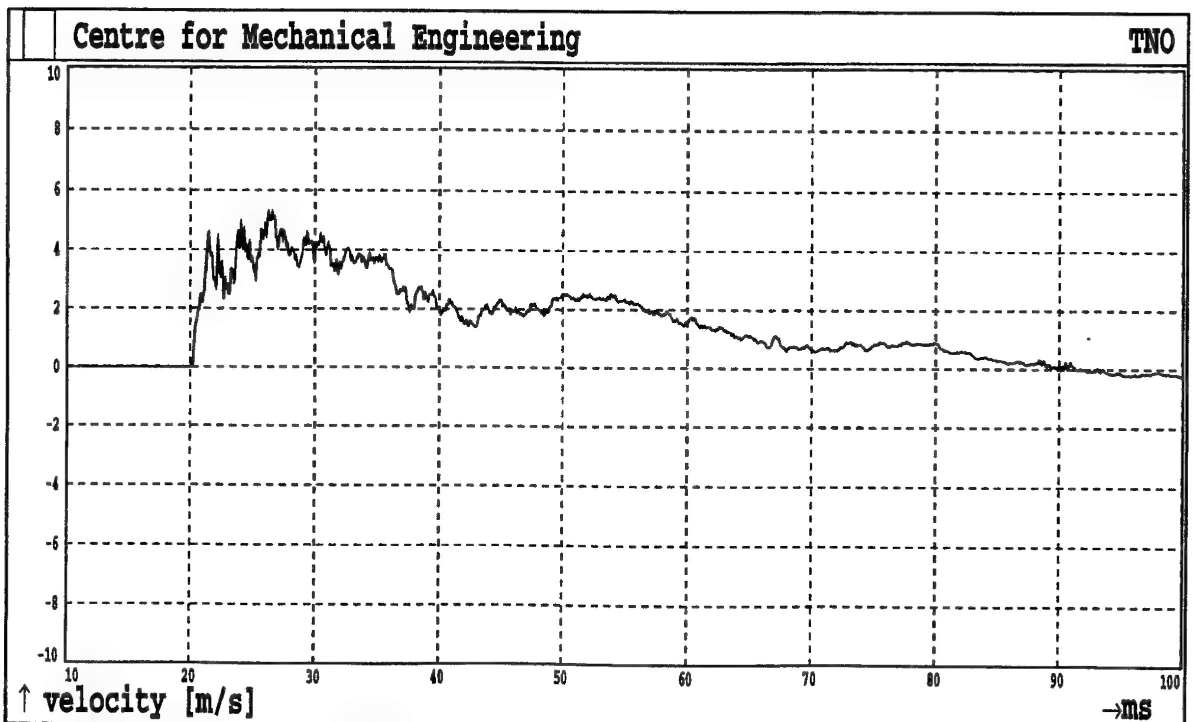


Fig.2B34. Shot 2 Sensor A2

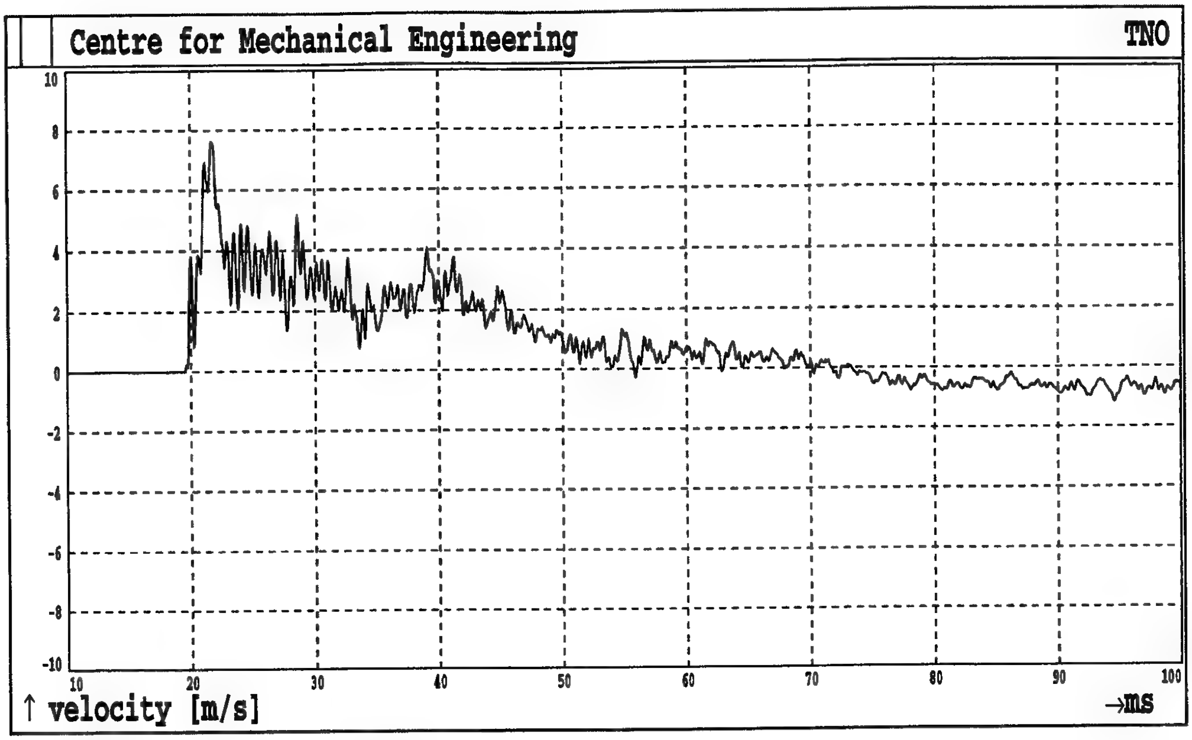


Fig.2B35. Shot 2 Sensor A3

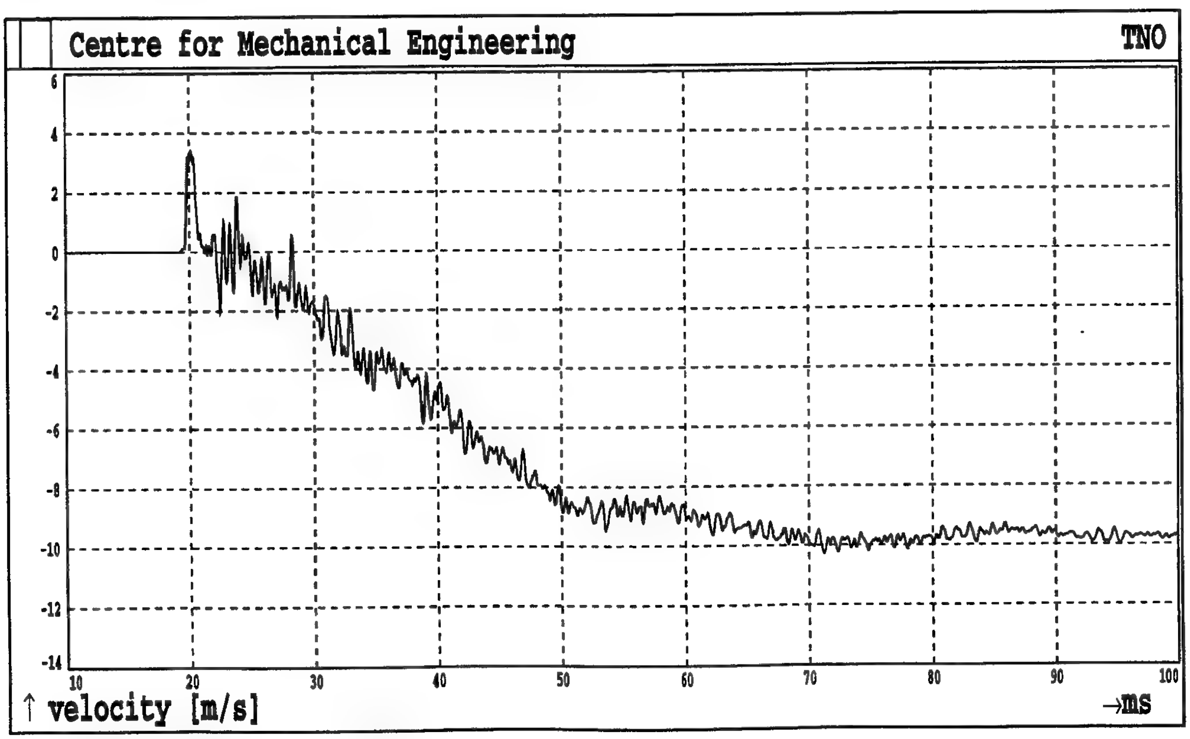


Fig.2B36. Shot 2 Sensor A4

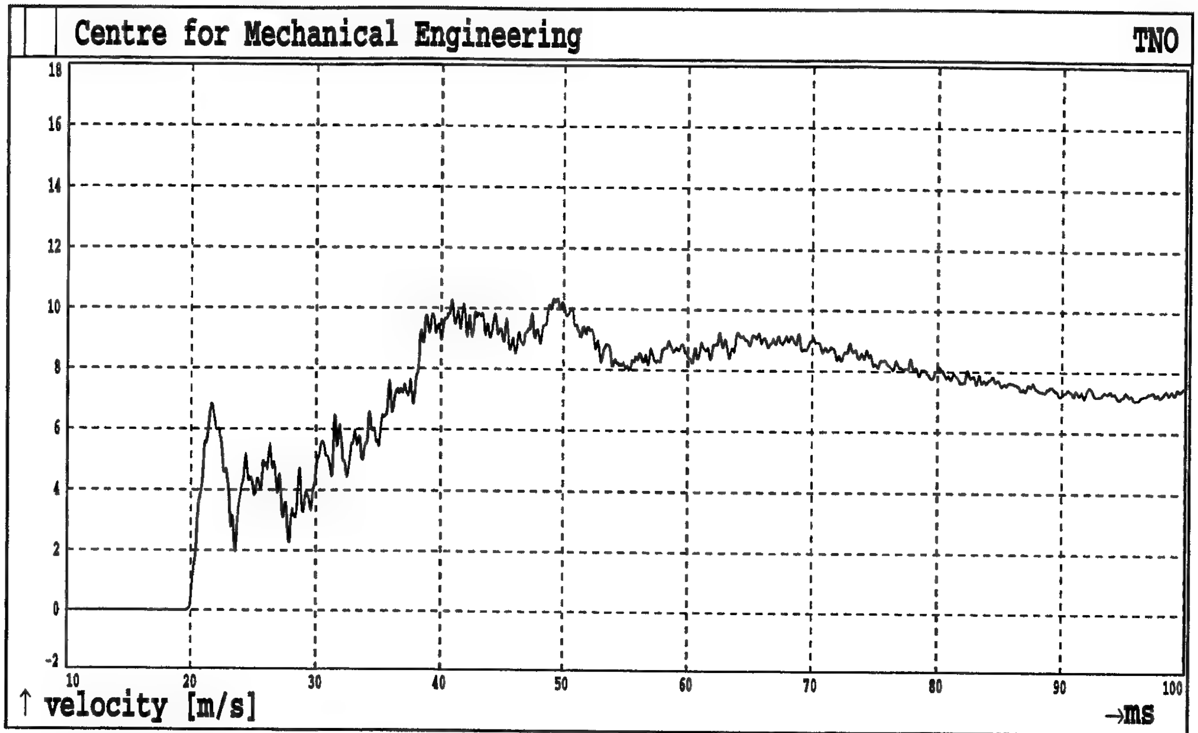


Fig.2B37. Shot 2 Sensor A5

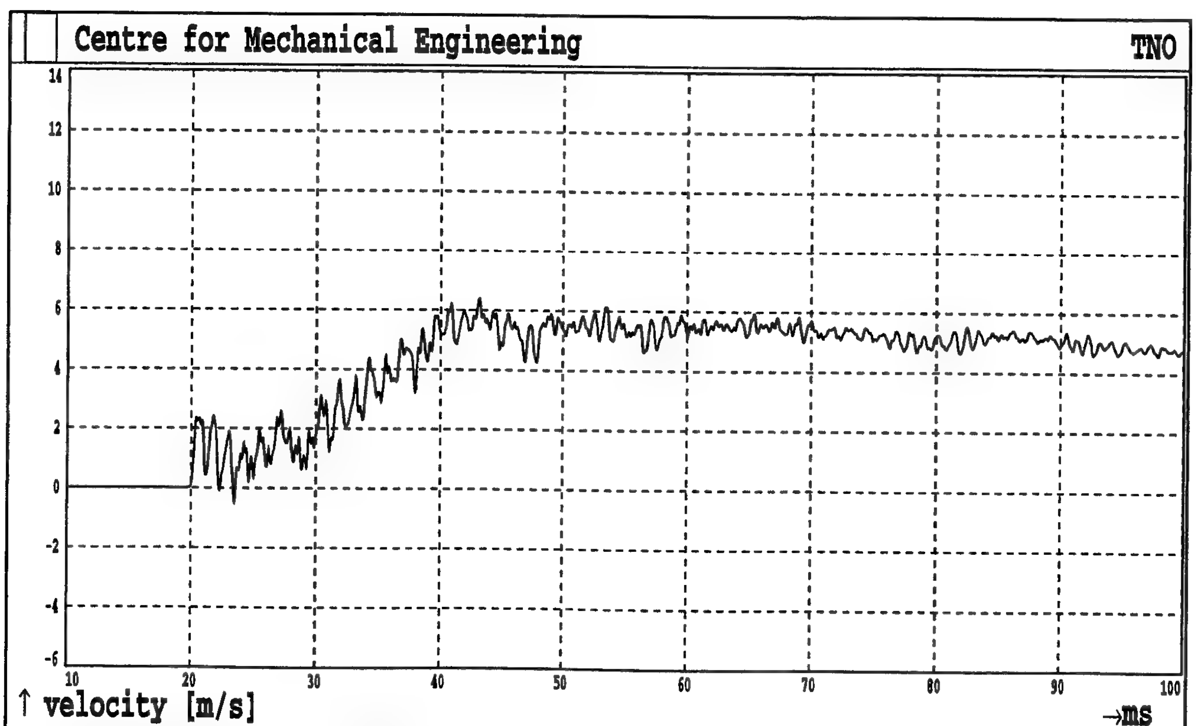


Fig.2B38. Shot 2 Sensor A6

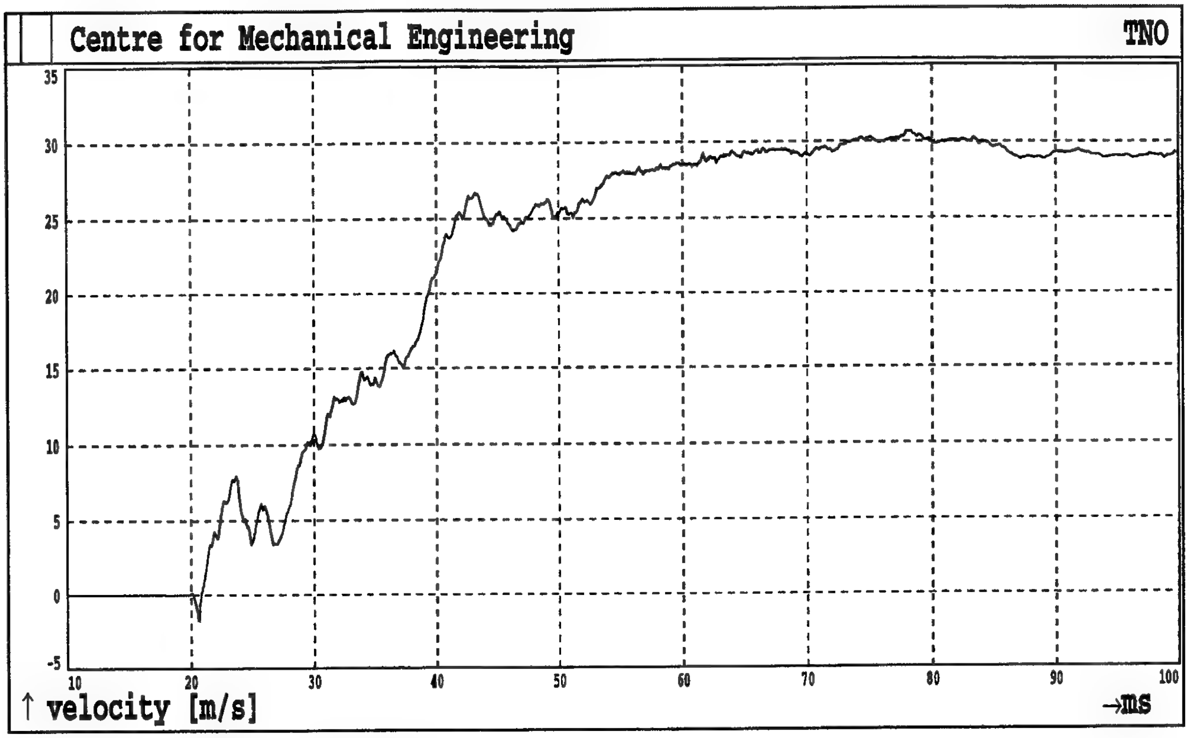


Fig.2B39. Shot 2 Sensor A7

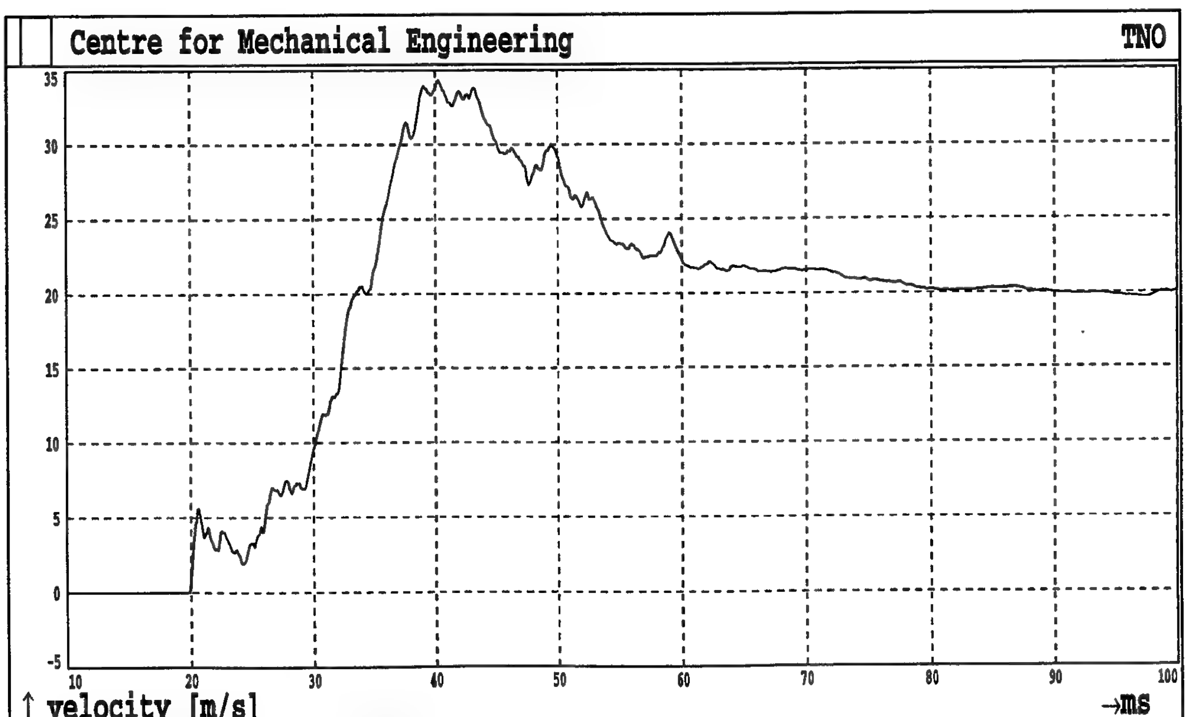


Fig.2B40. Shot 2 Sensor A8

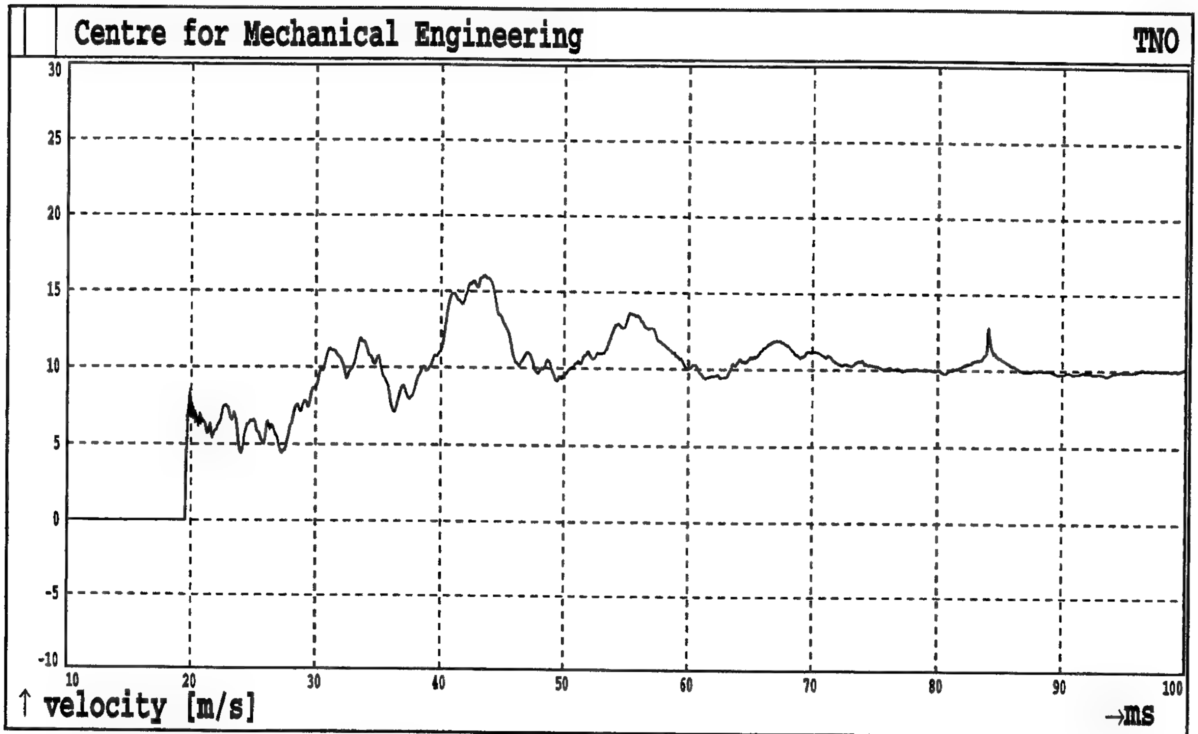


Fig.2B41. Shot 2 Sensor A9

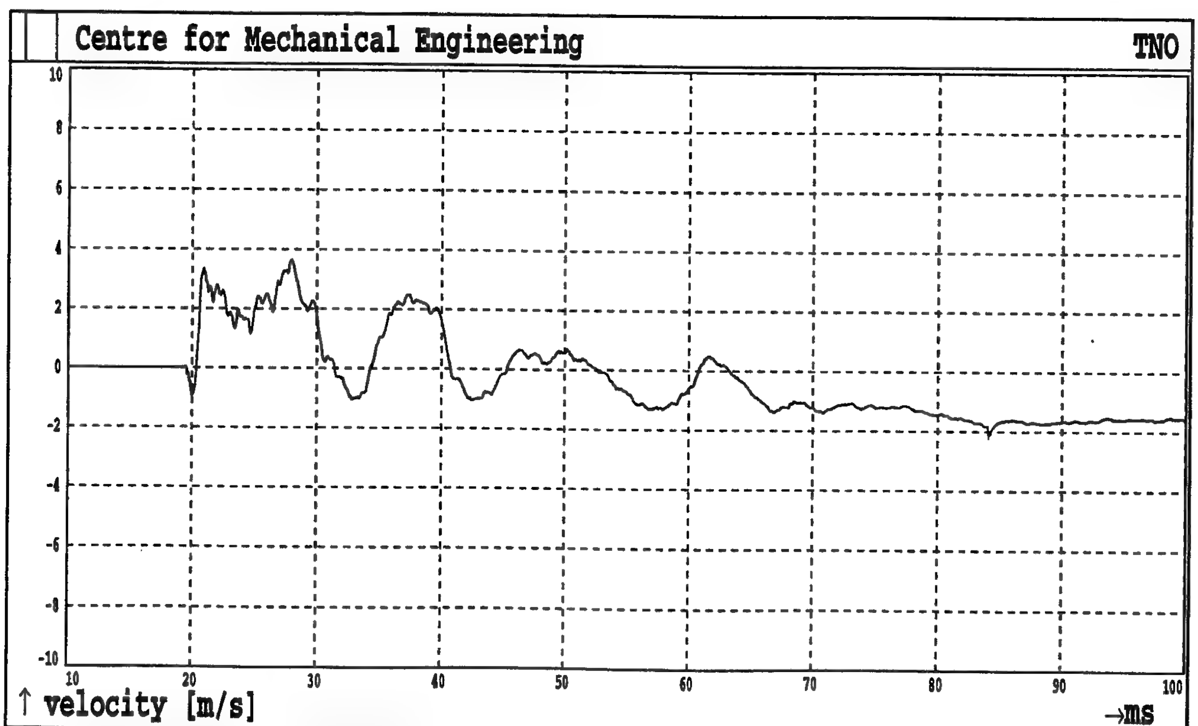


Fig.2B42. Shot 2 Sensor A10

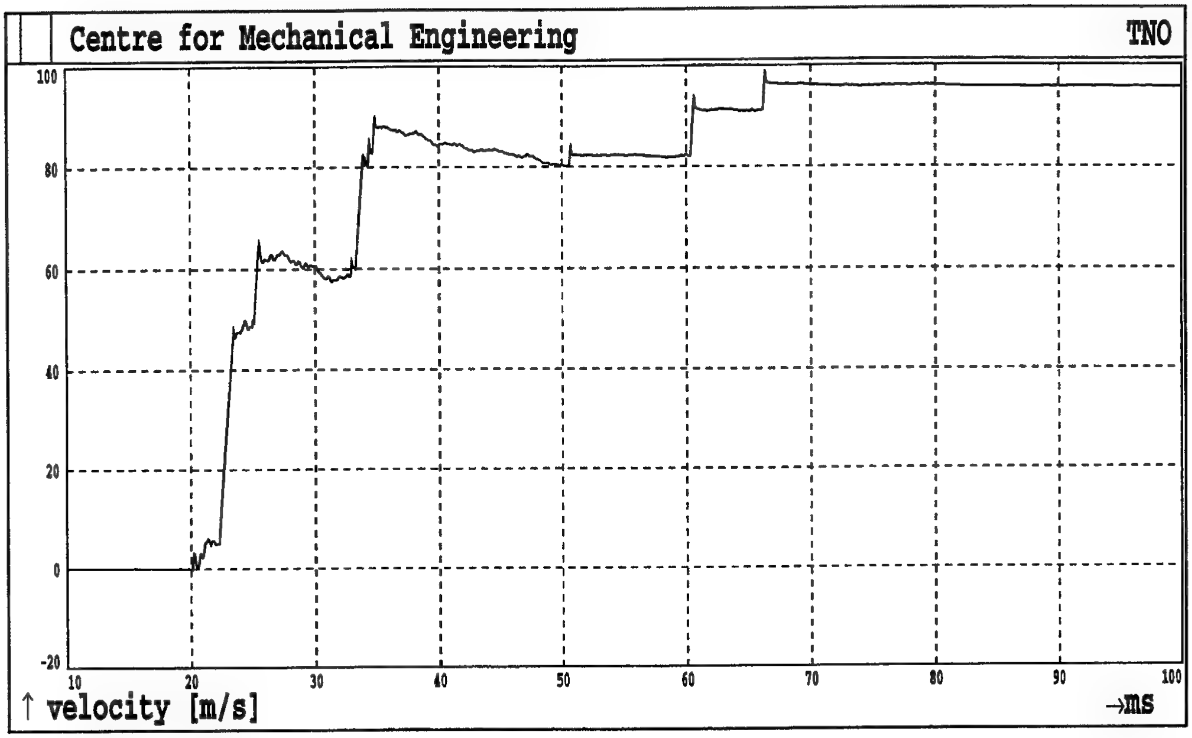


Fig.2B43. Shot 2 Sensor A11

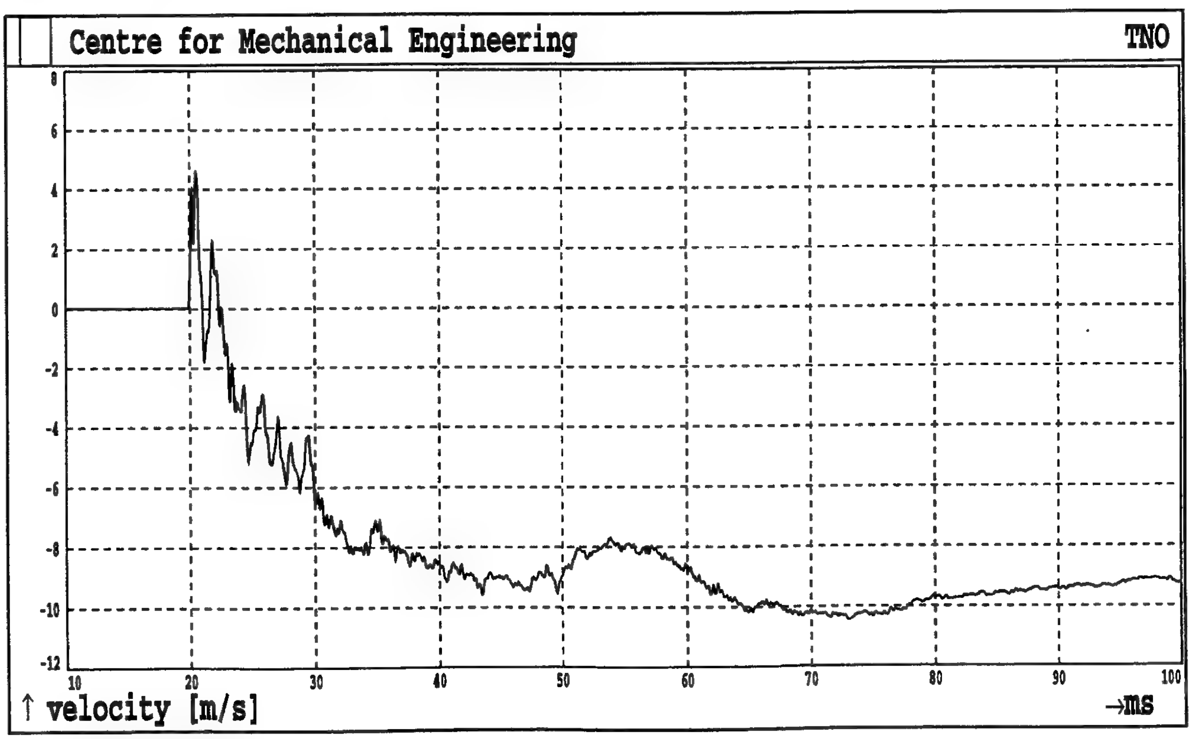


Fig.2B44. Shot 2 Sensor A12

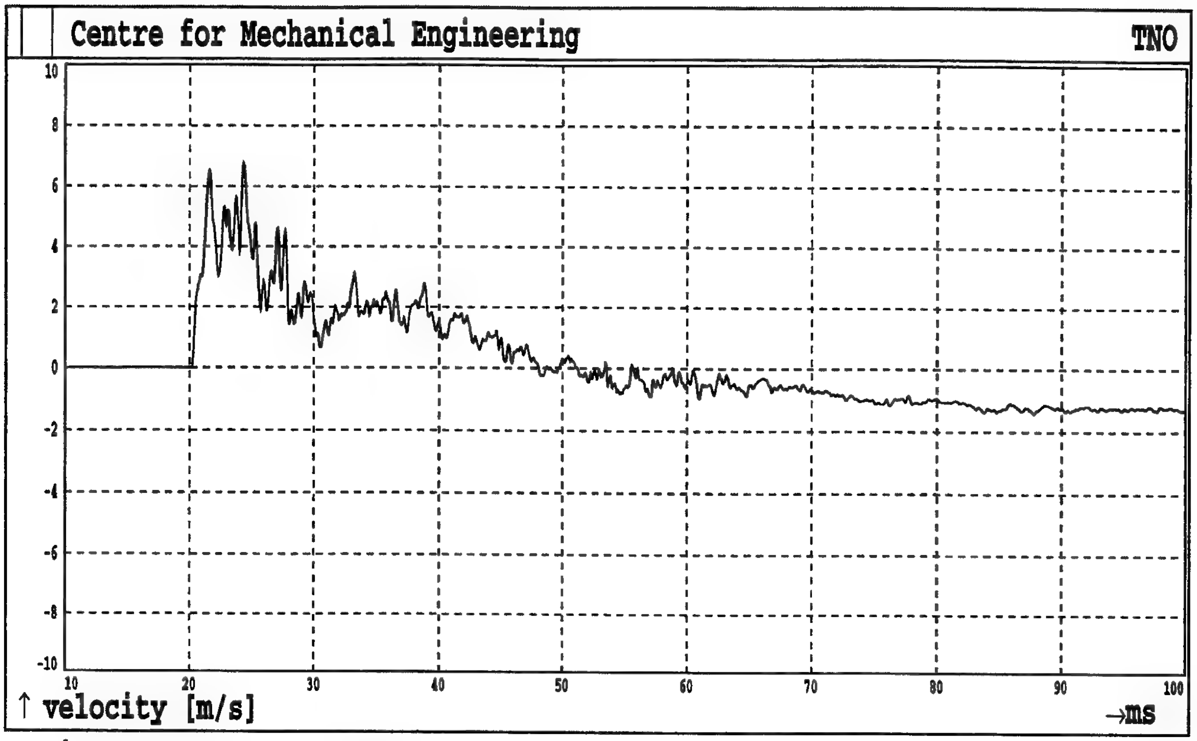


Fig.2B45. Shot 2 Sensor A13

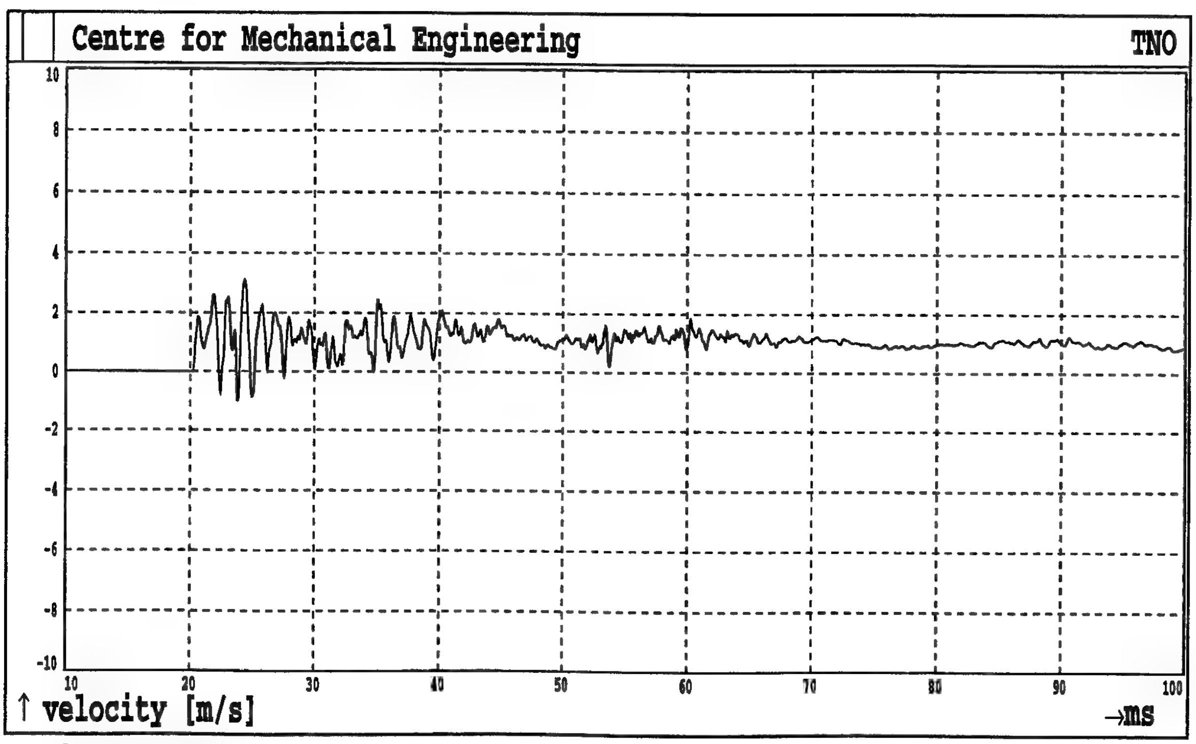


Fig.2B46. Shot 2 Sensor A14

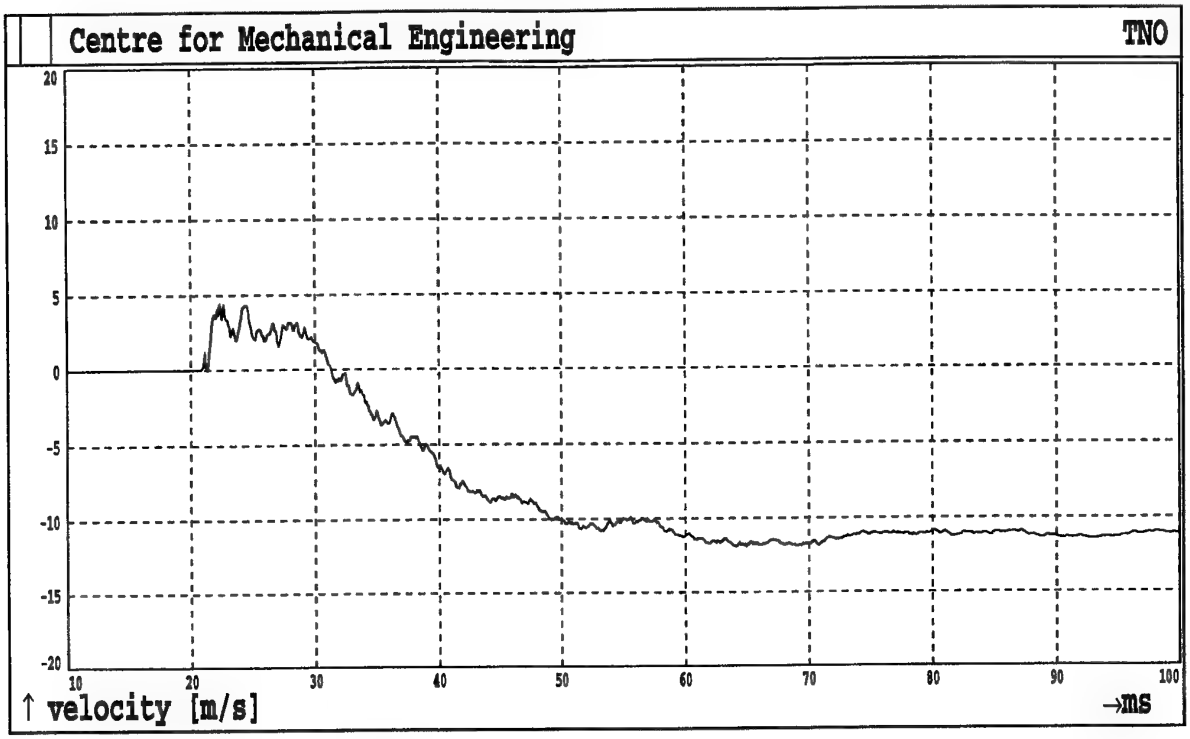


Fig.2B47. Shot 2 Sensor A15

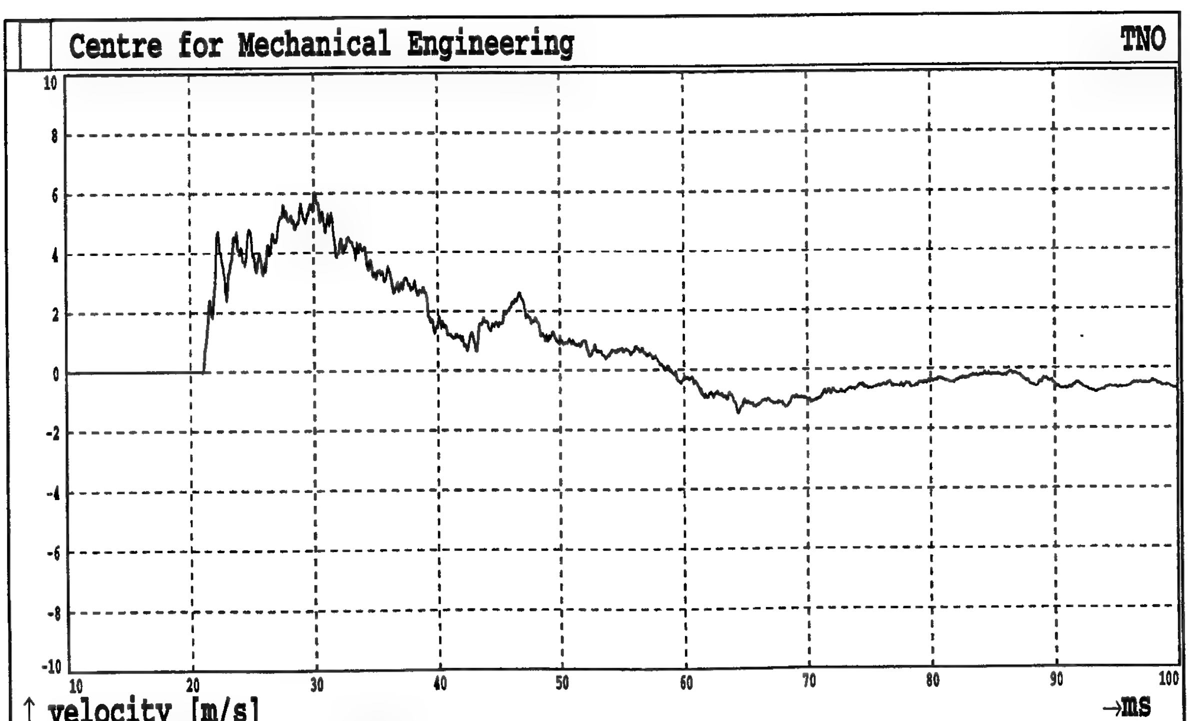


Fig.2B48. Shot 2 Sensor A16

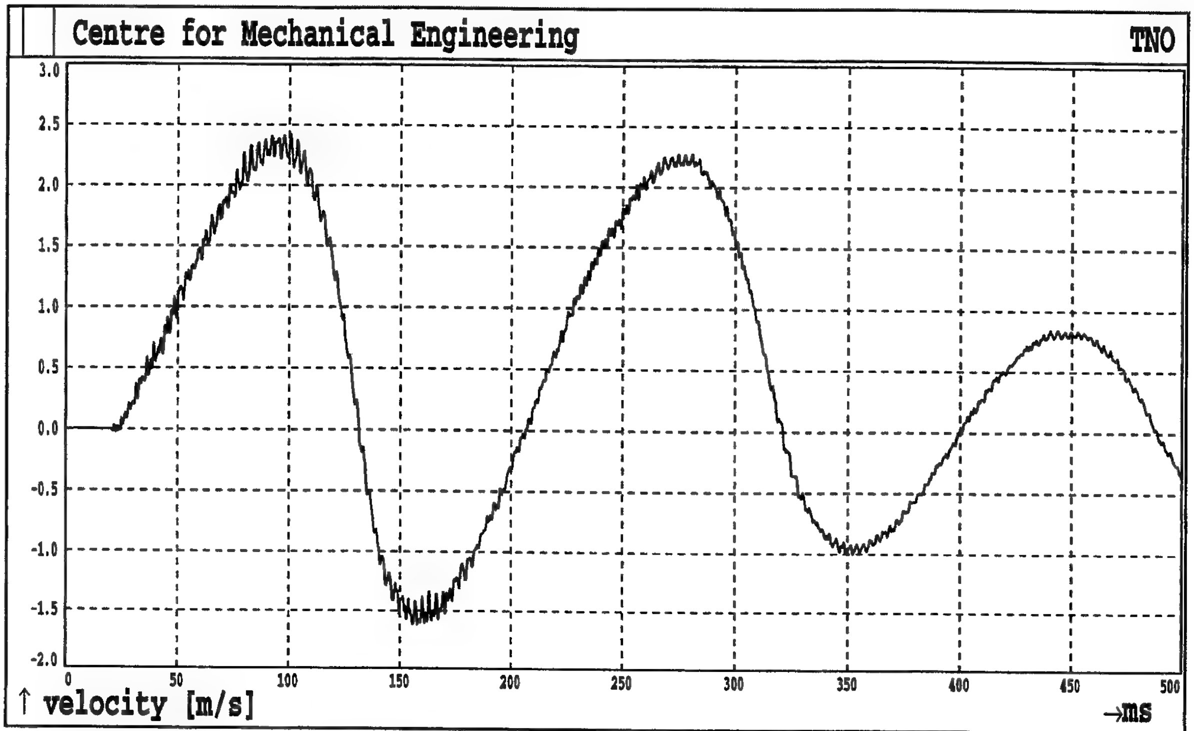


Fig.2B49. Shot 2 Sensor A17

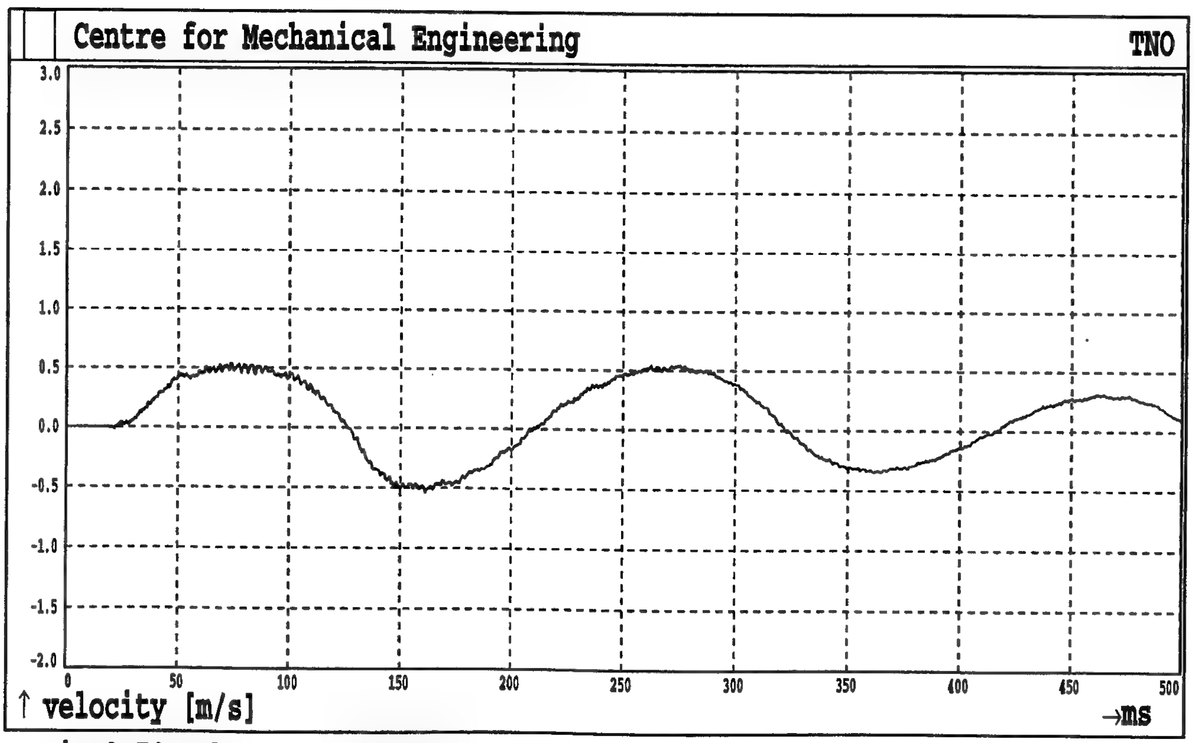


Fig.2B50. Shot 2 Sensor A18

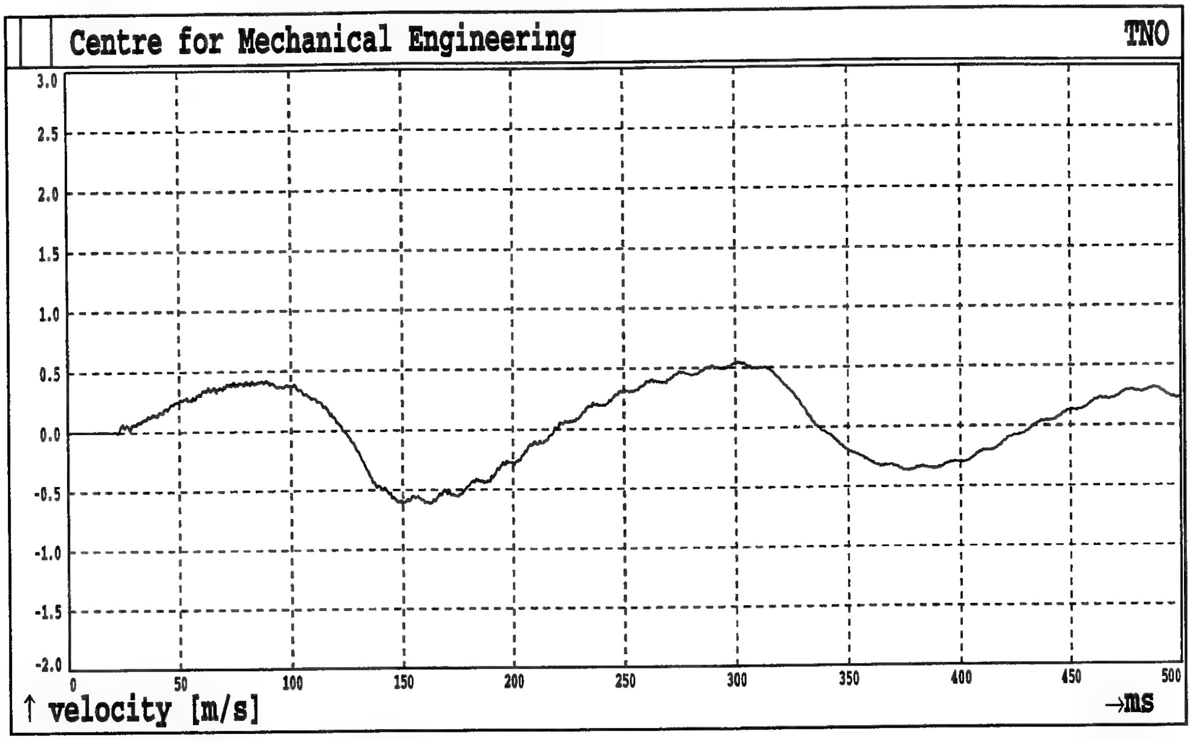


Fig.2B51. Shot 2 Sensor A19

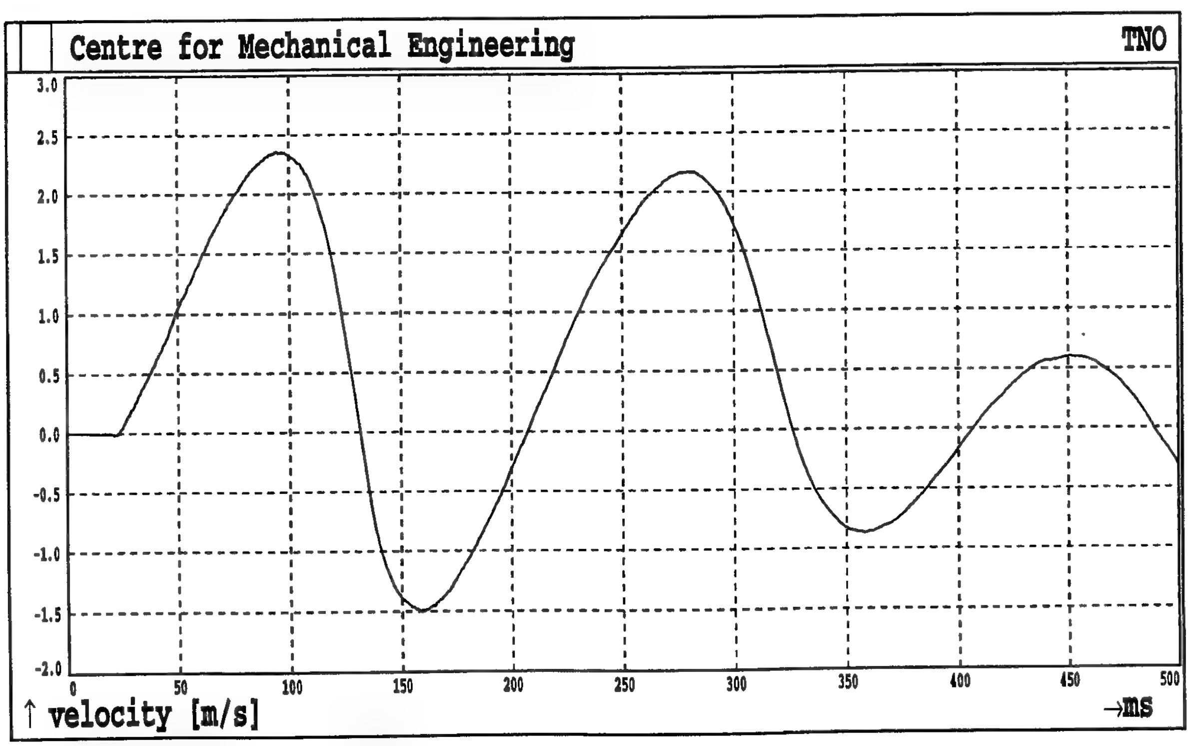


Fig.2B52. Shot 2 Sensor A20

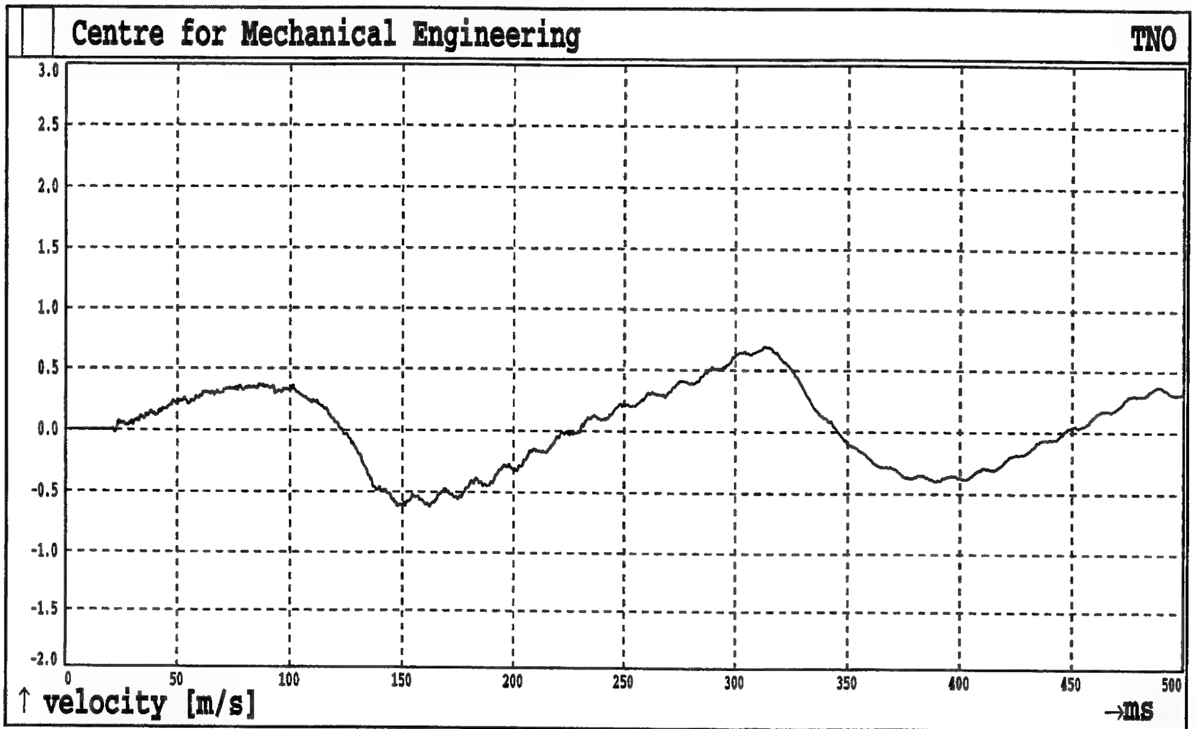


Fig.2B53. Shot 2 Sensor A21

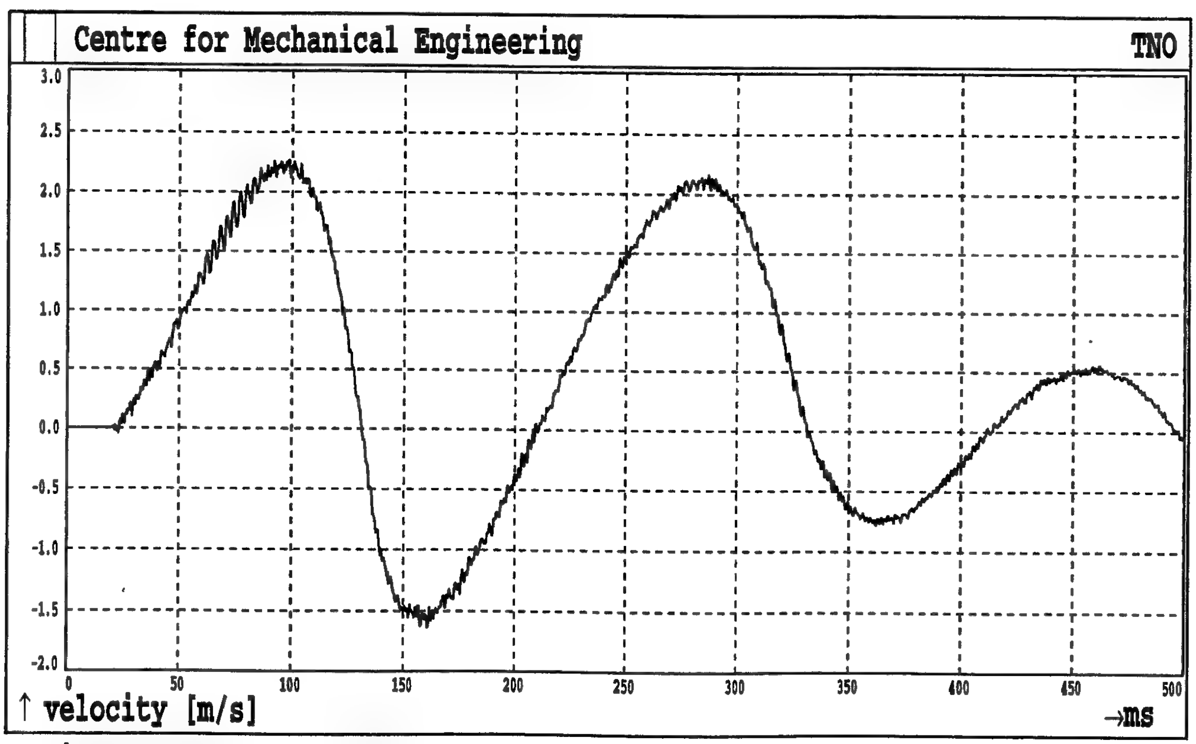


Fig.2B54. Shot 2 Sensor A22

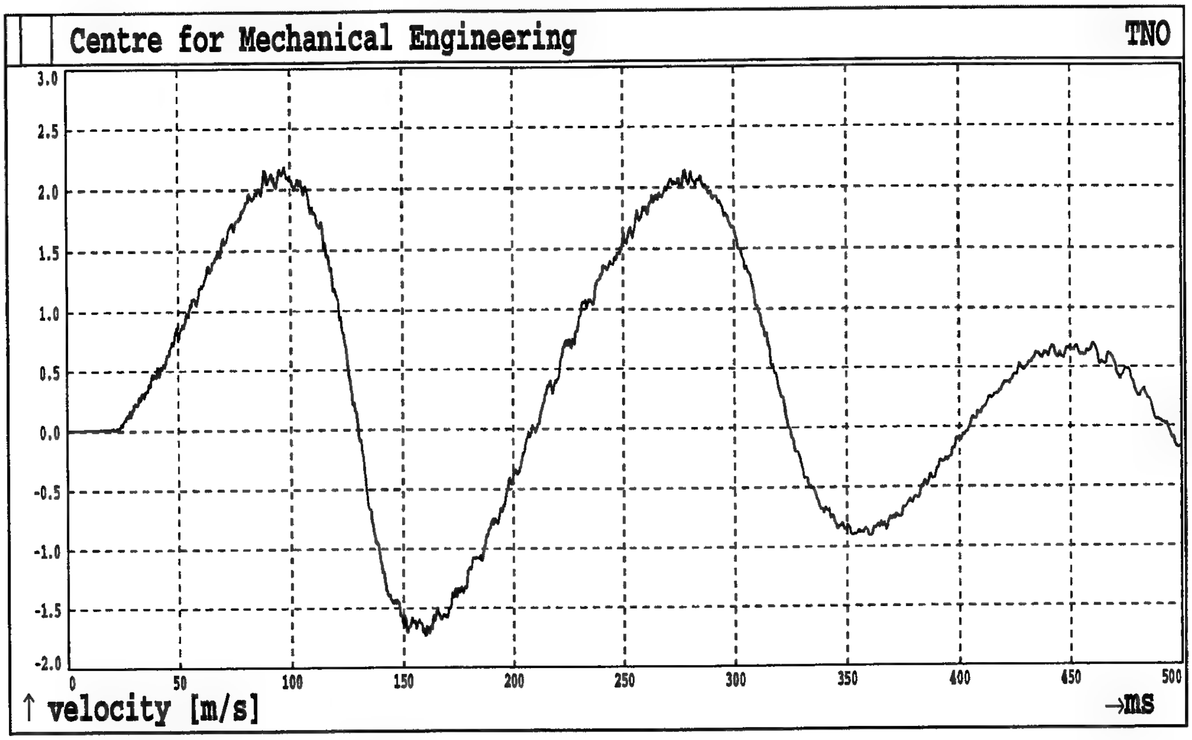


Fig.2B55. Shot 2 Sensor A23

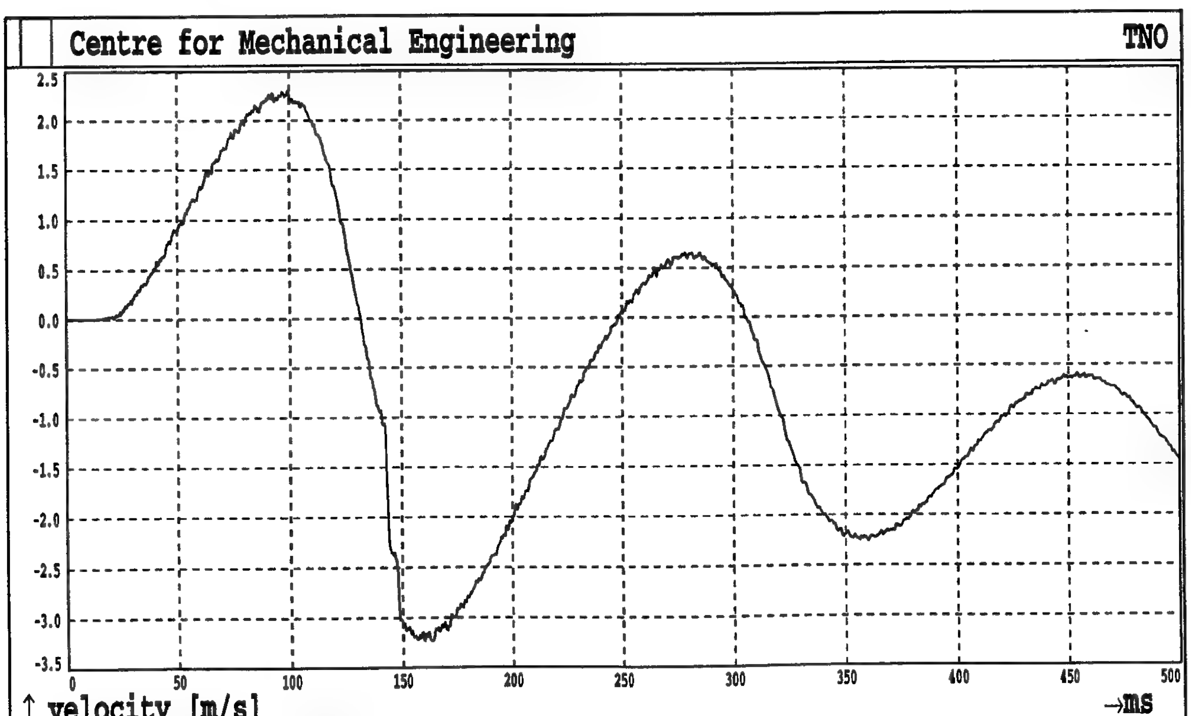


Fig.2B56. Shot 2 Sensor A24

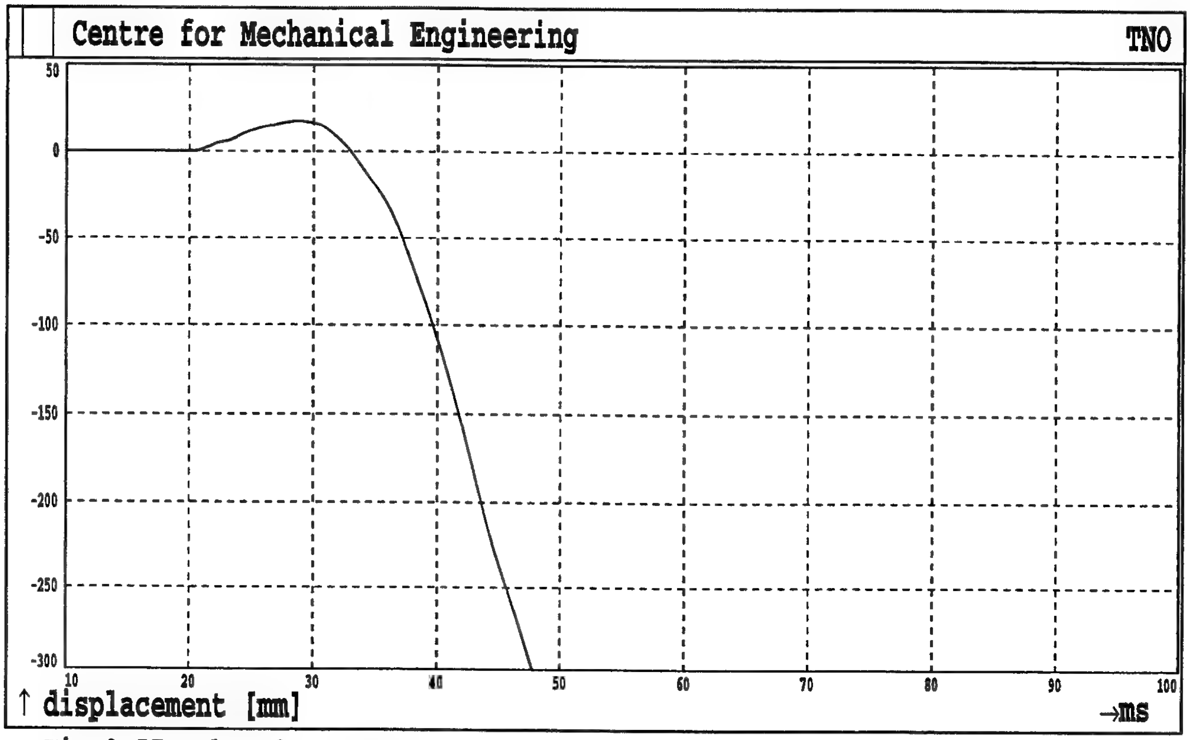


Fig.2B57. Shot 2 Sensor A1

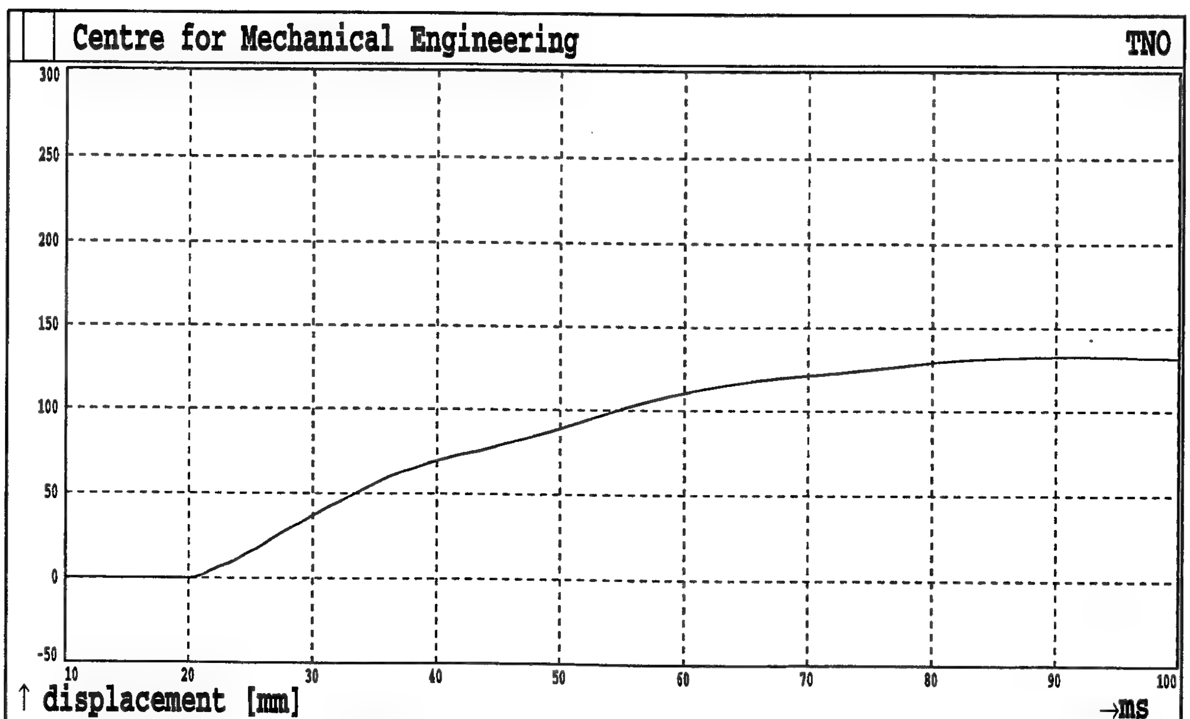


Fig.2B58. Shot 2 Sensor A2

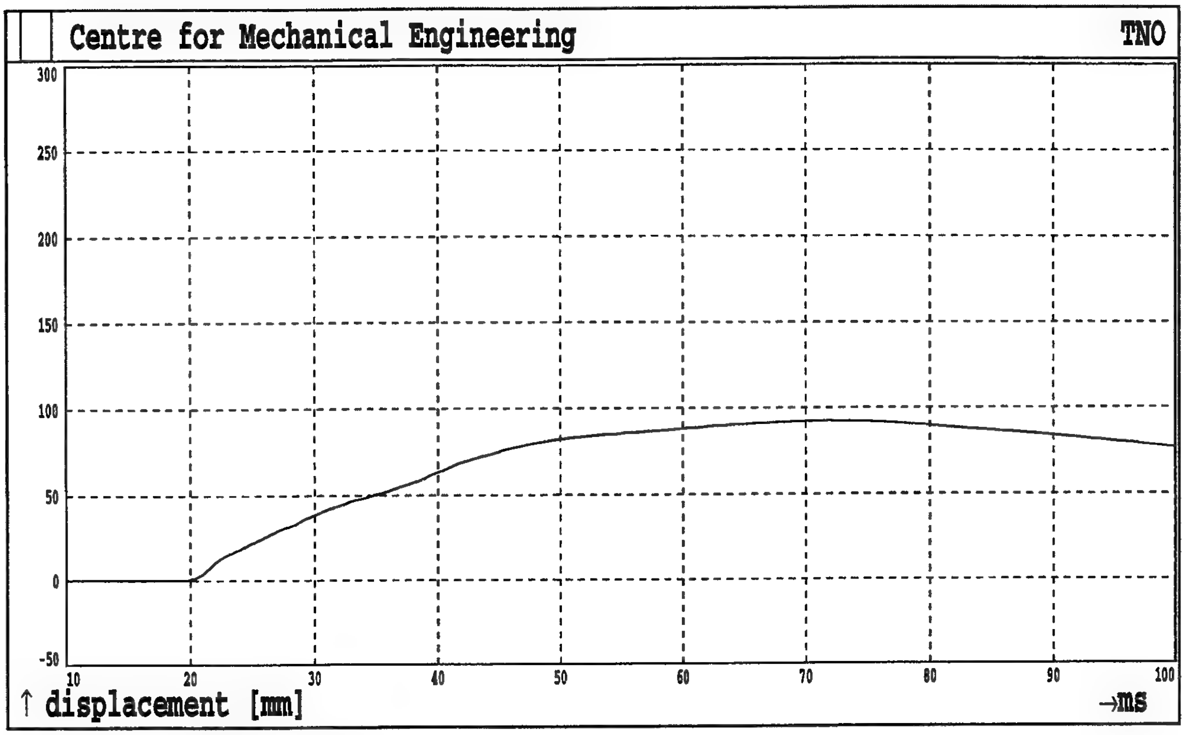


Fig.2B59. Shot 2 Sensor A3

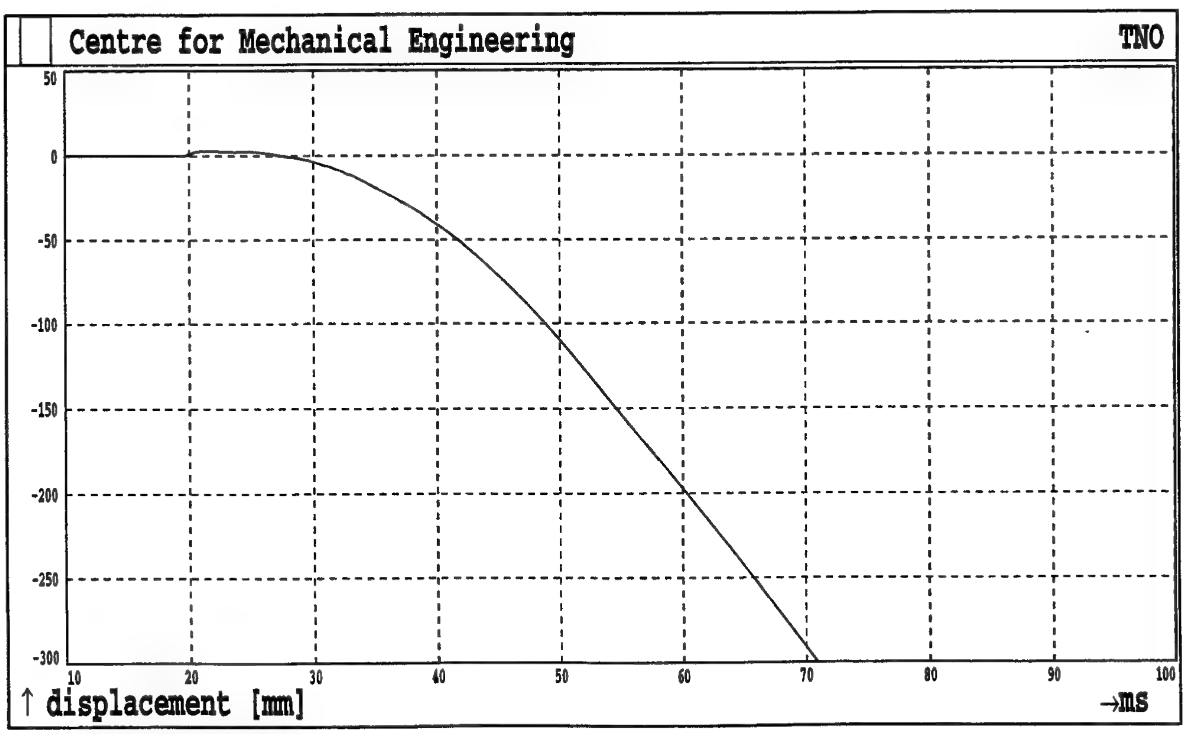


Fig.2B60. Shot 2 Sensor A4

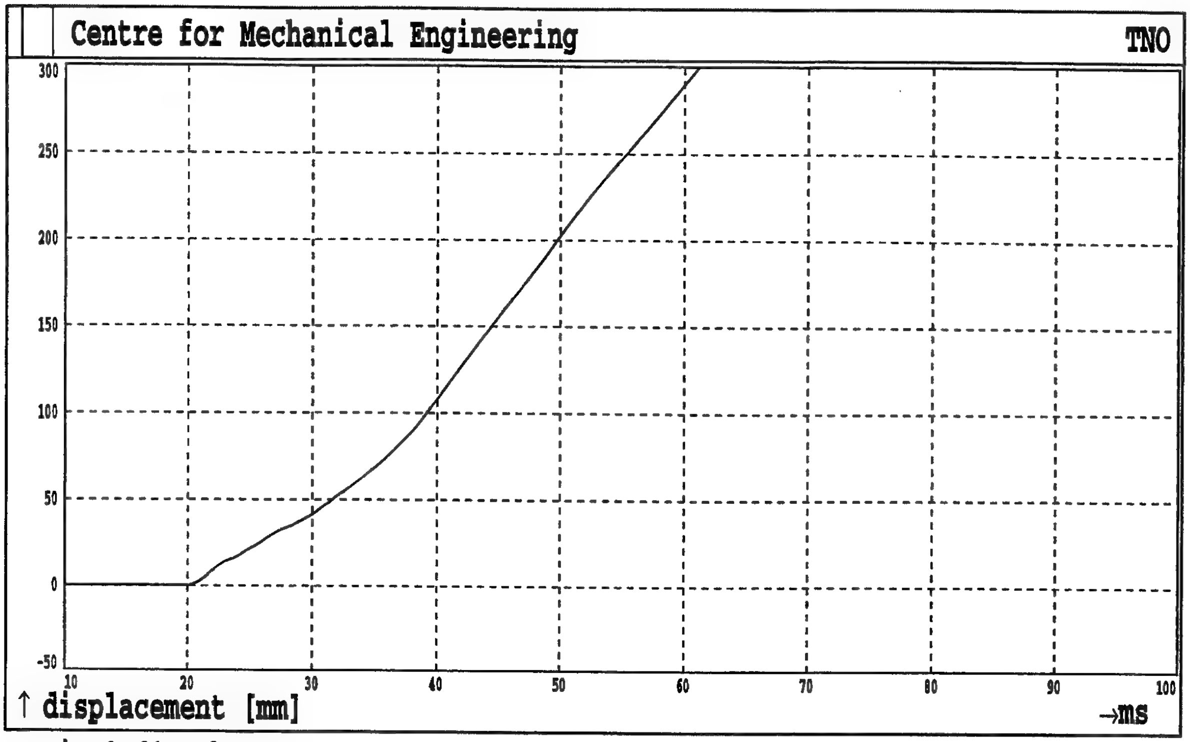


Fig.2B61. Shot 2 Sensor A5

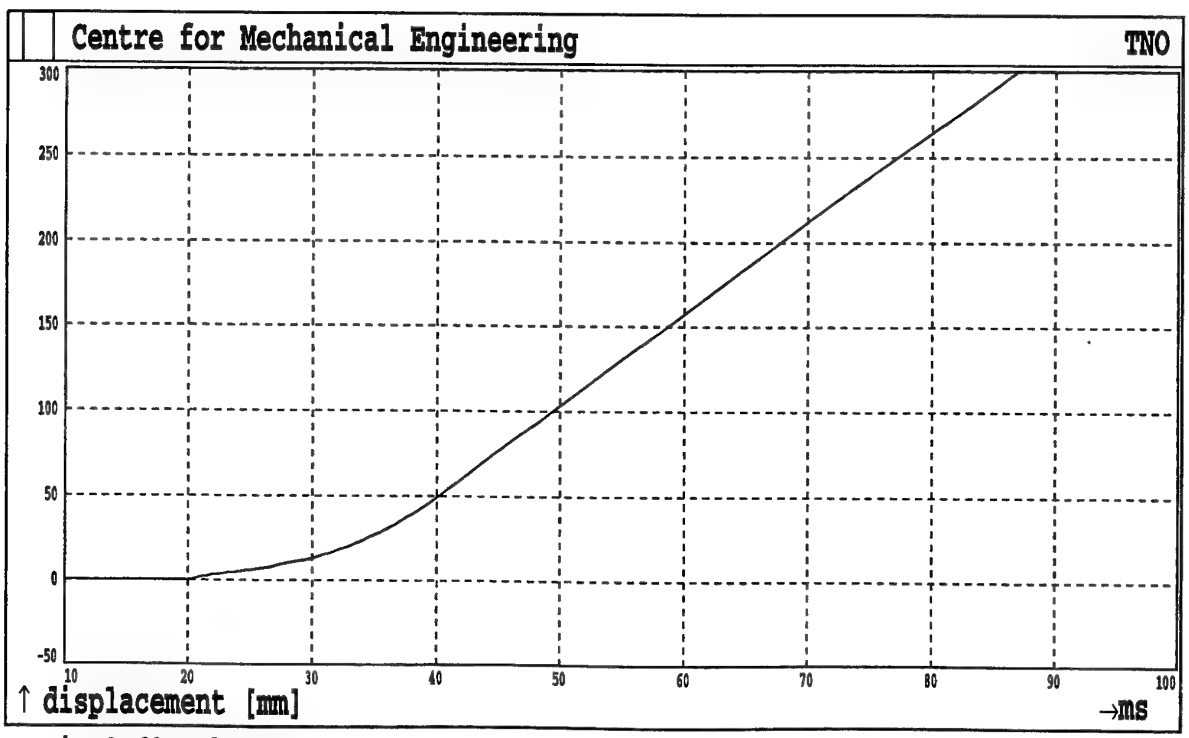


Fig.2B62. Shot 2 Sensor A6

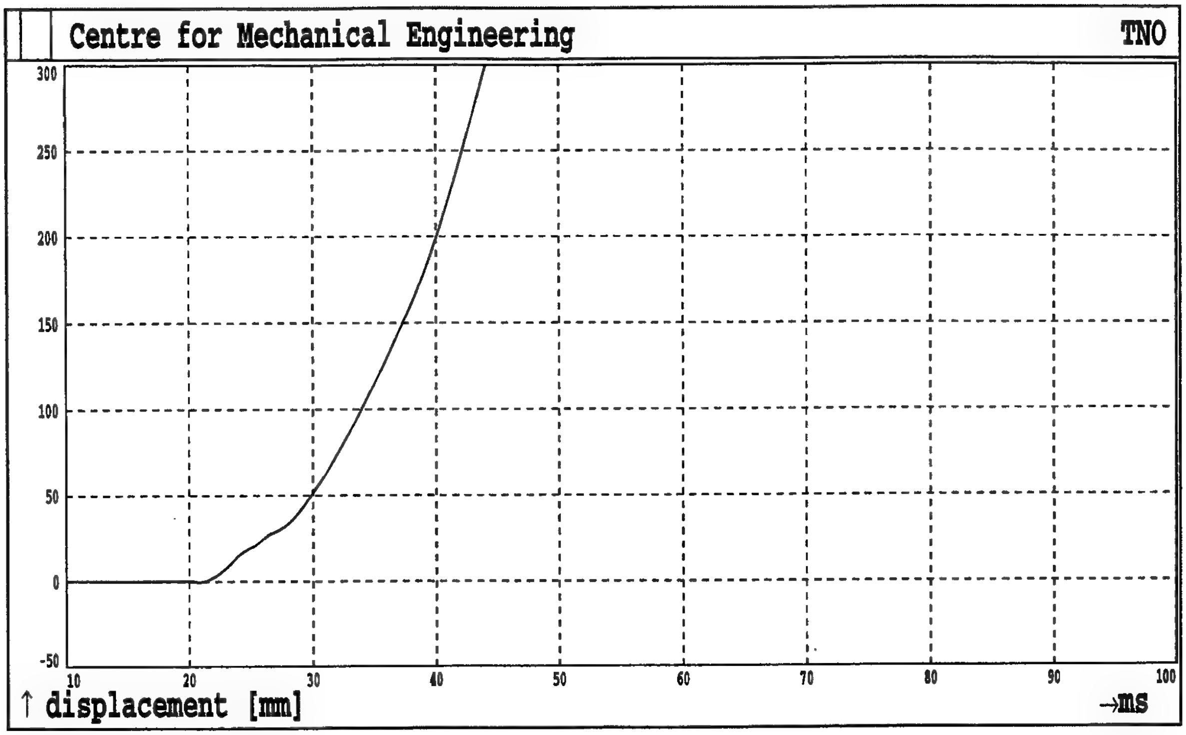


Fig.2B63. Shot 2 Sensor A7

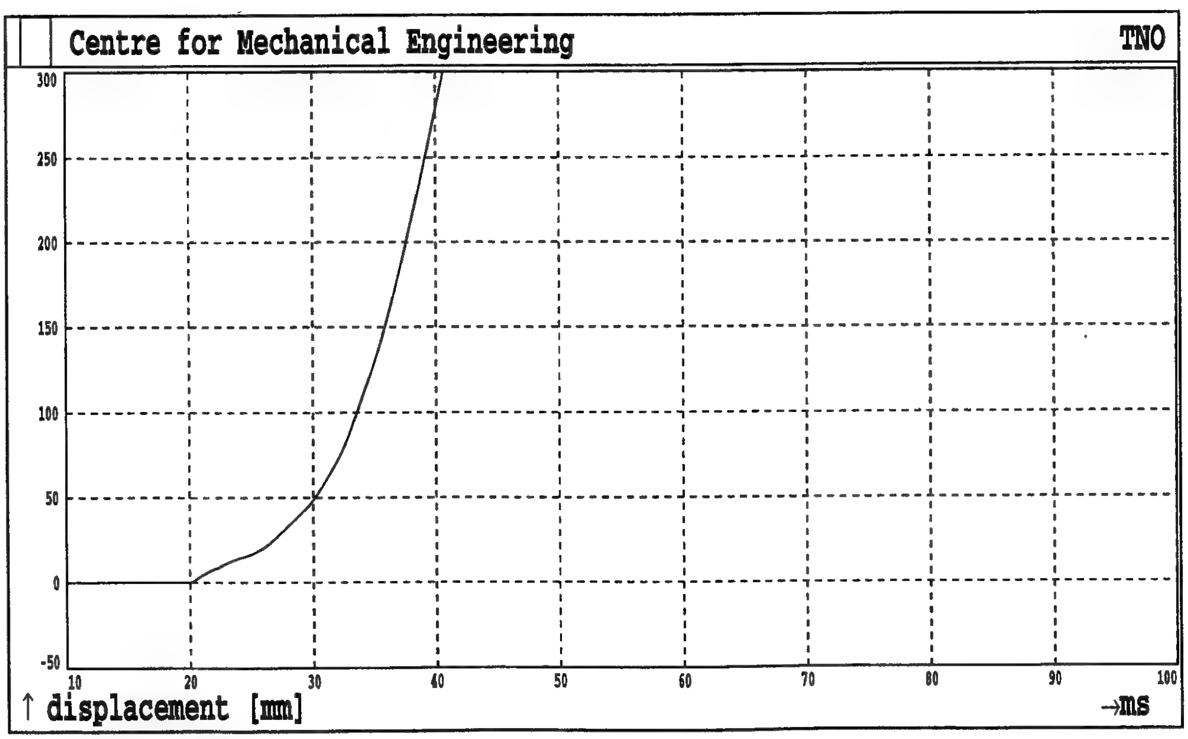


Fig.2B64. Shot 2 Sensor A8

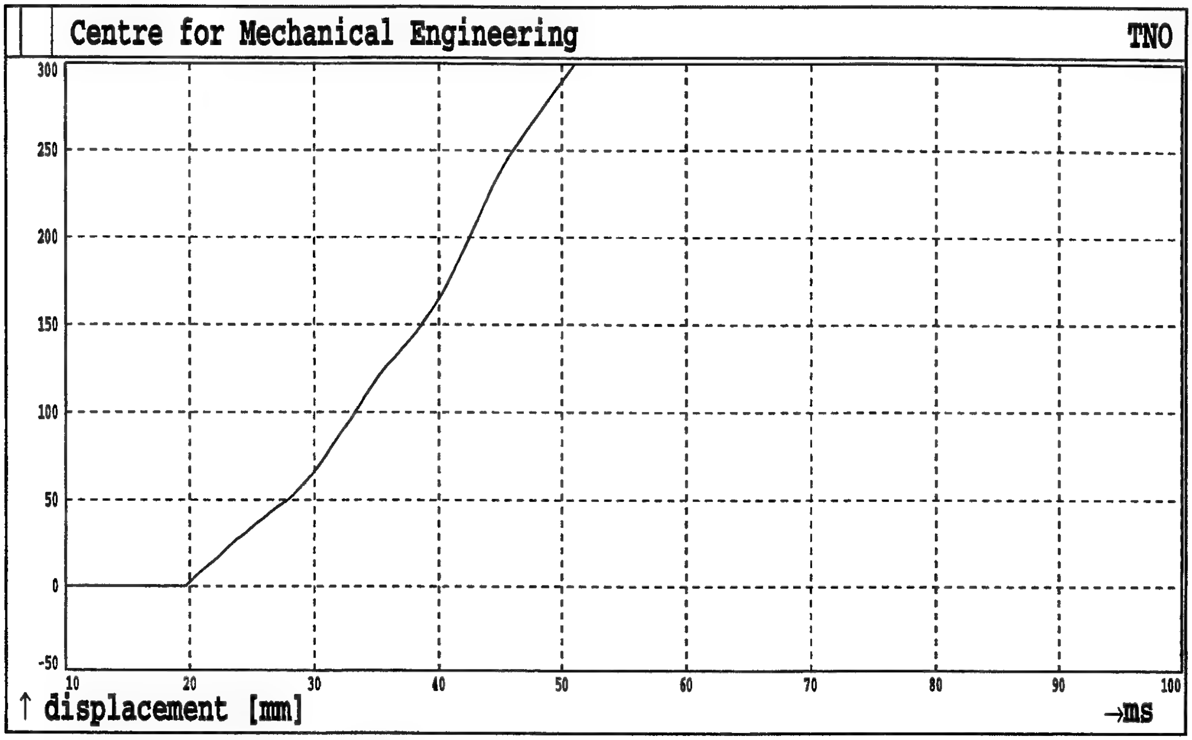


Fig.2B65. Shot 2 Sensor A9

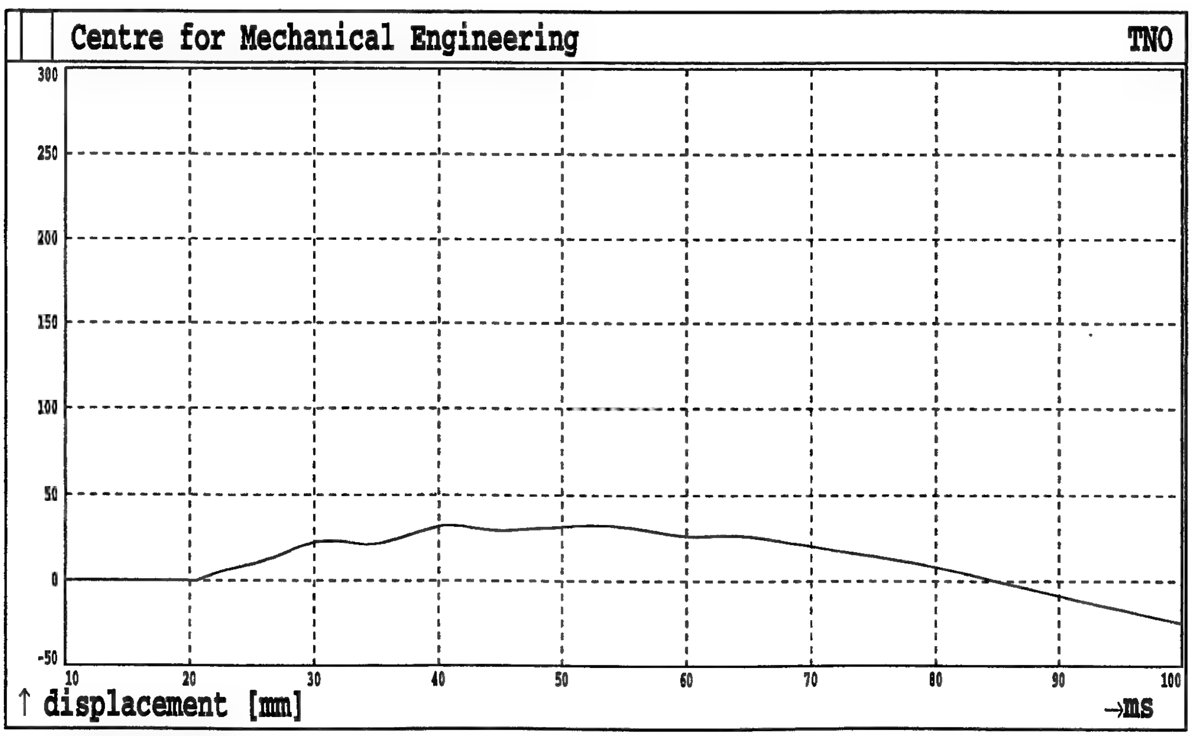


Fig.2B66. Shot 2 Sensor A10

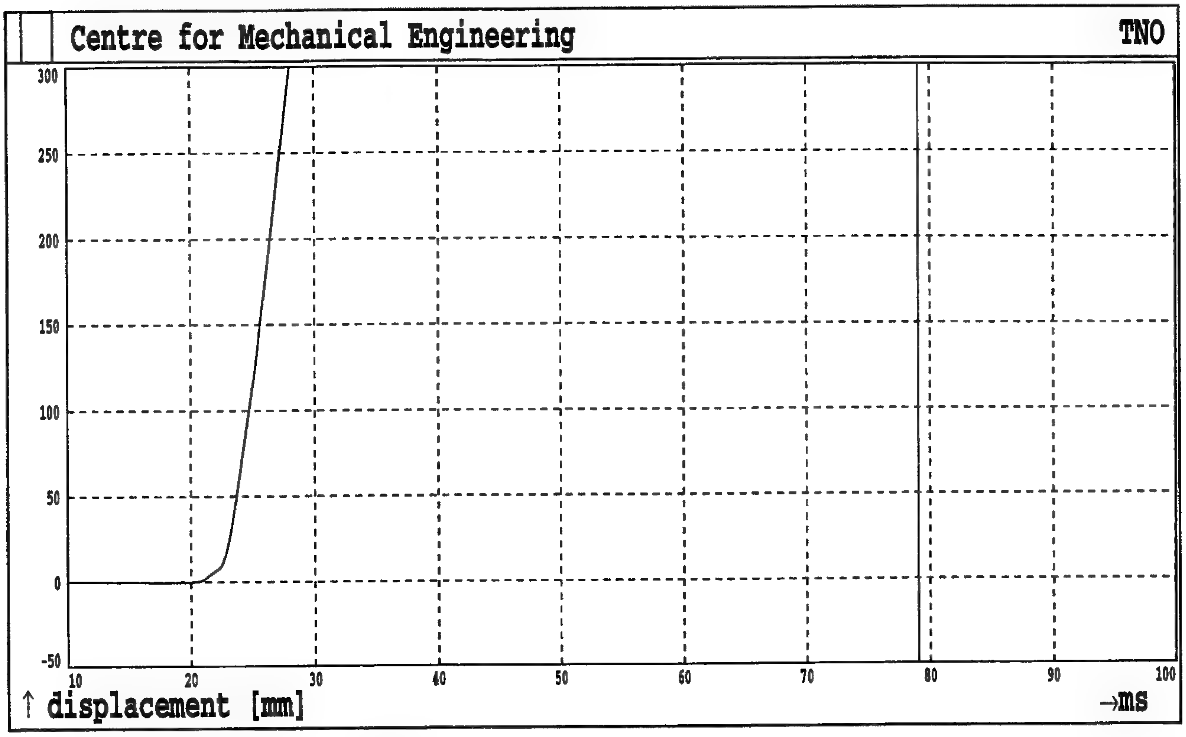


Fig.2B67. Shot 2 Sensor A11

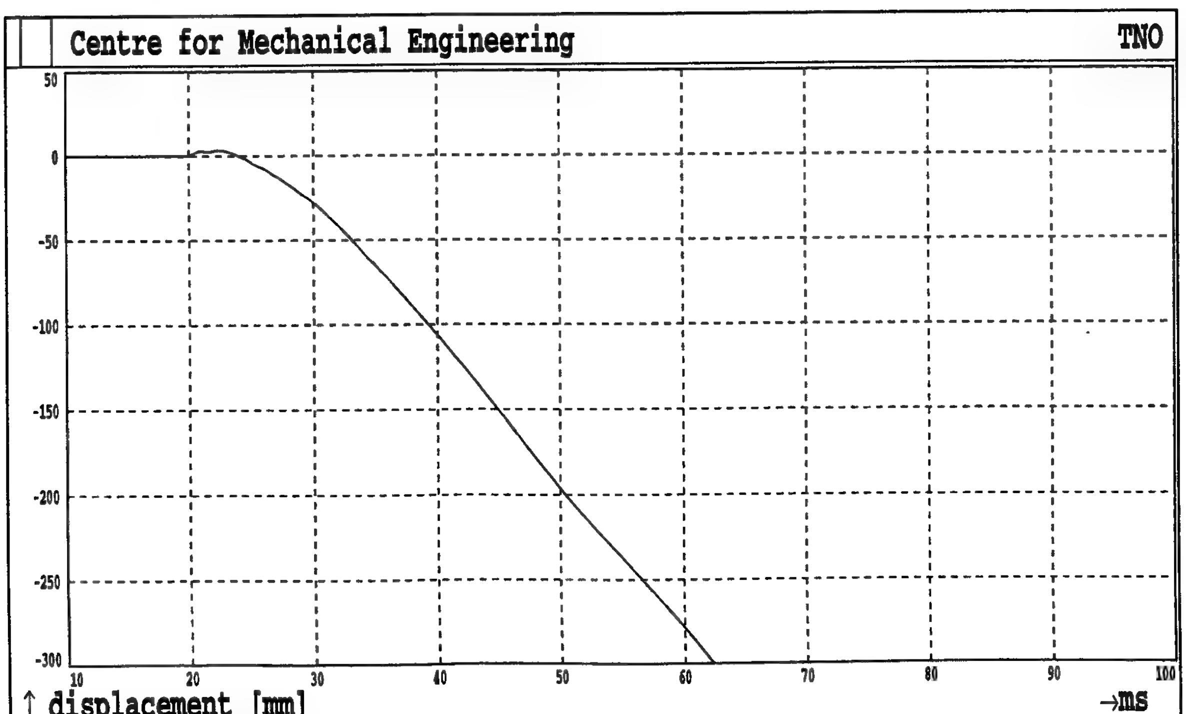


Fig.2B68. Shot 2 Sensor A12

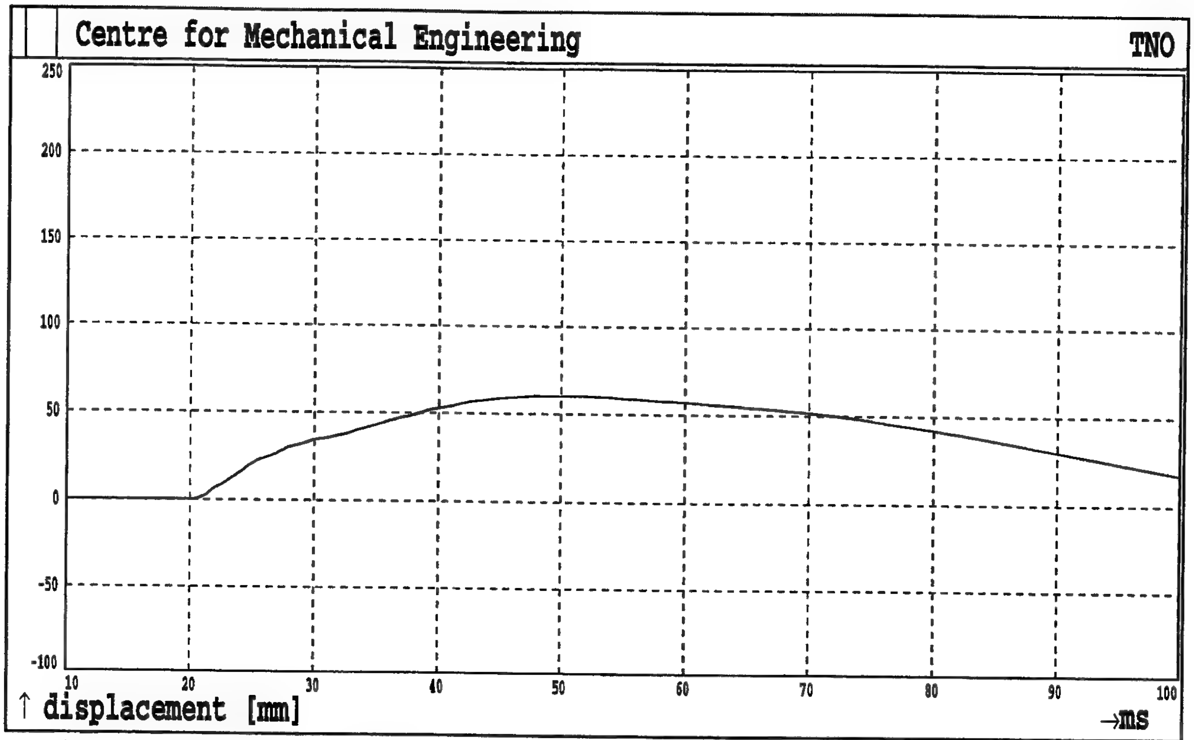


Fig.2B69. Shot 2 Sensor A13

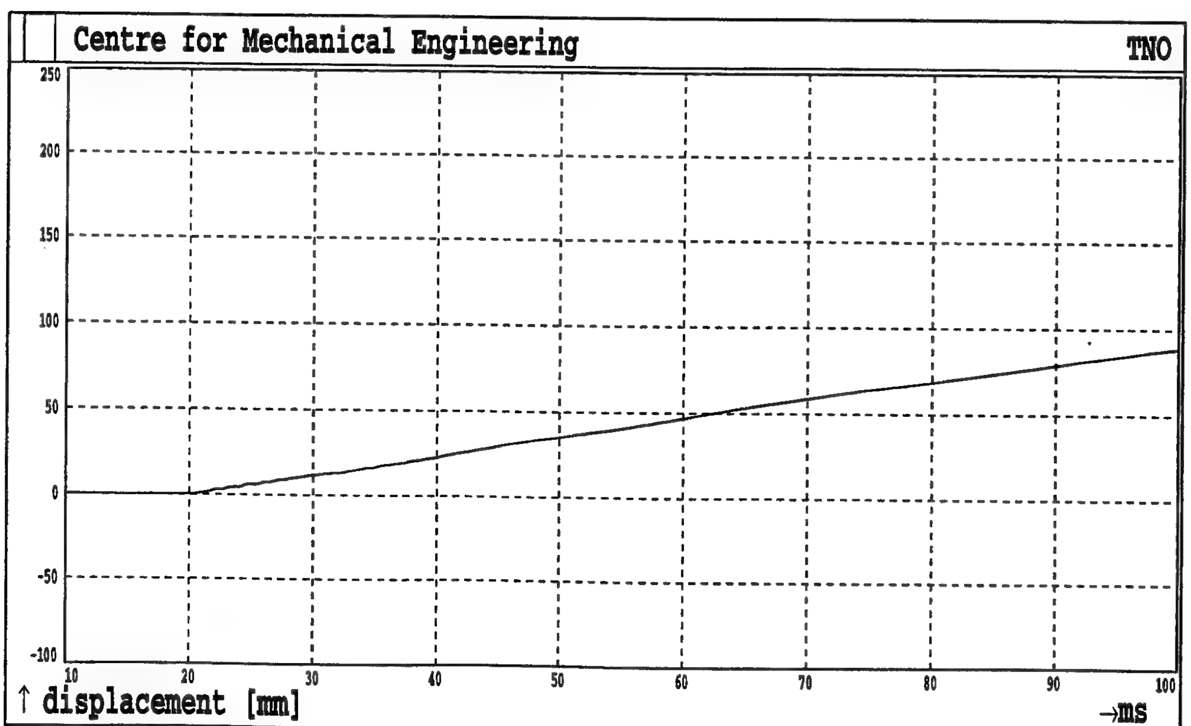


Fig.2B70. Shot 2 Sensor A14

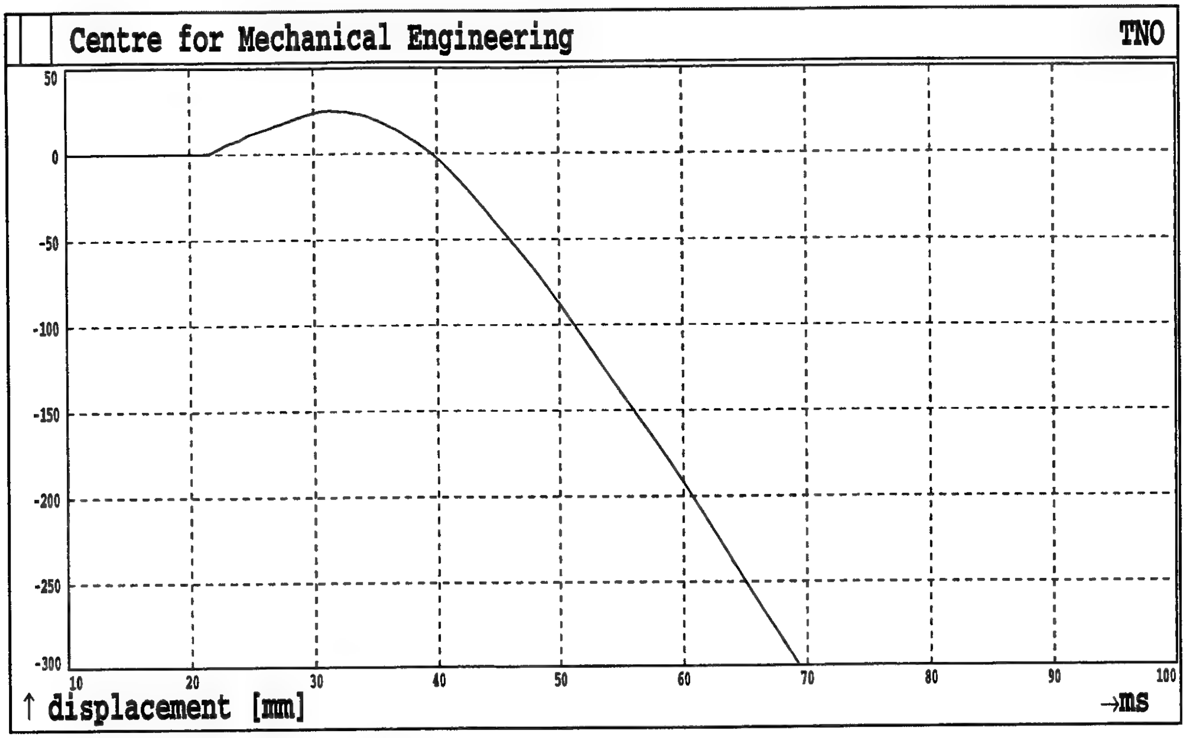


Fig.2B71. Shot 2 Sensor A15

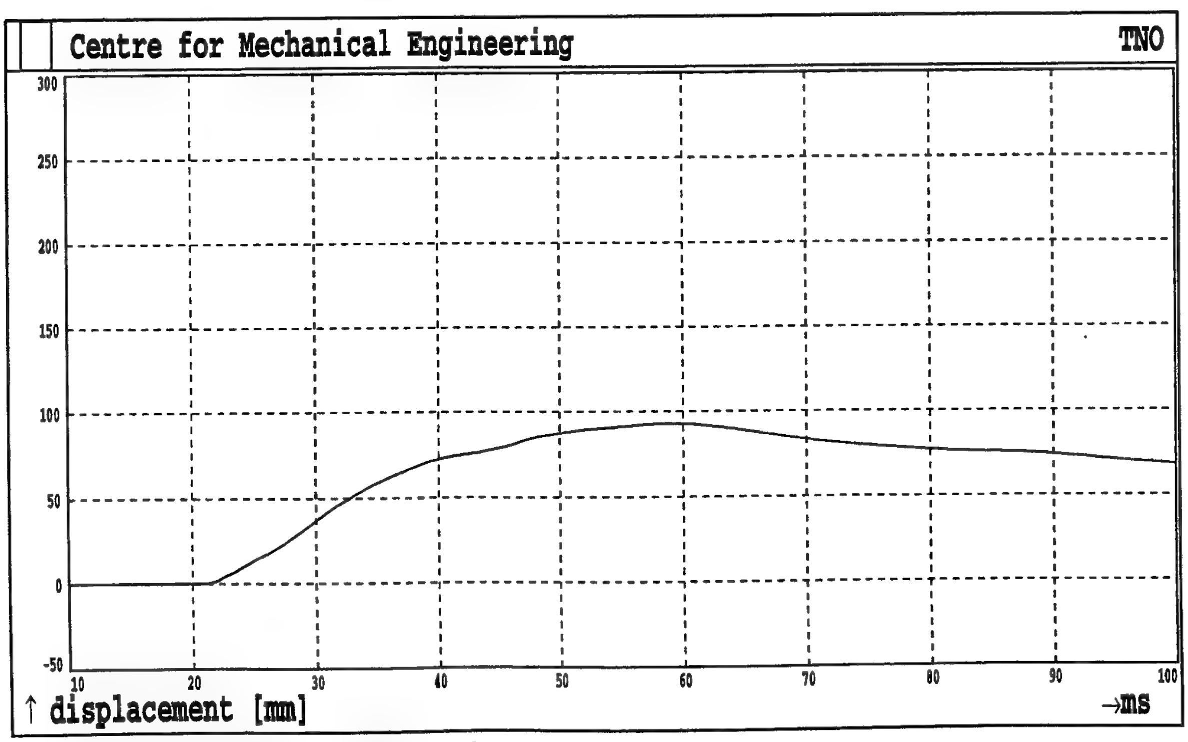


Fig.2B72. Shot 2 Sensor A16

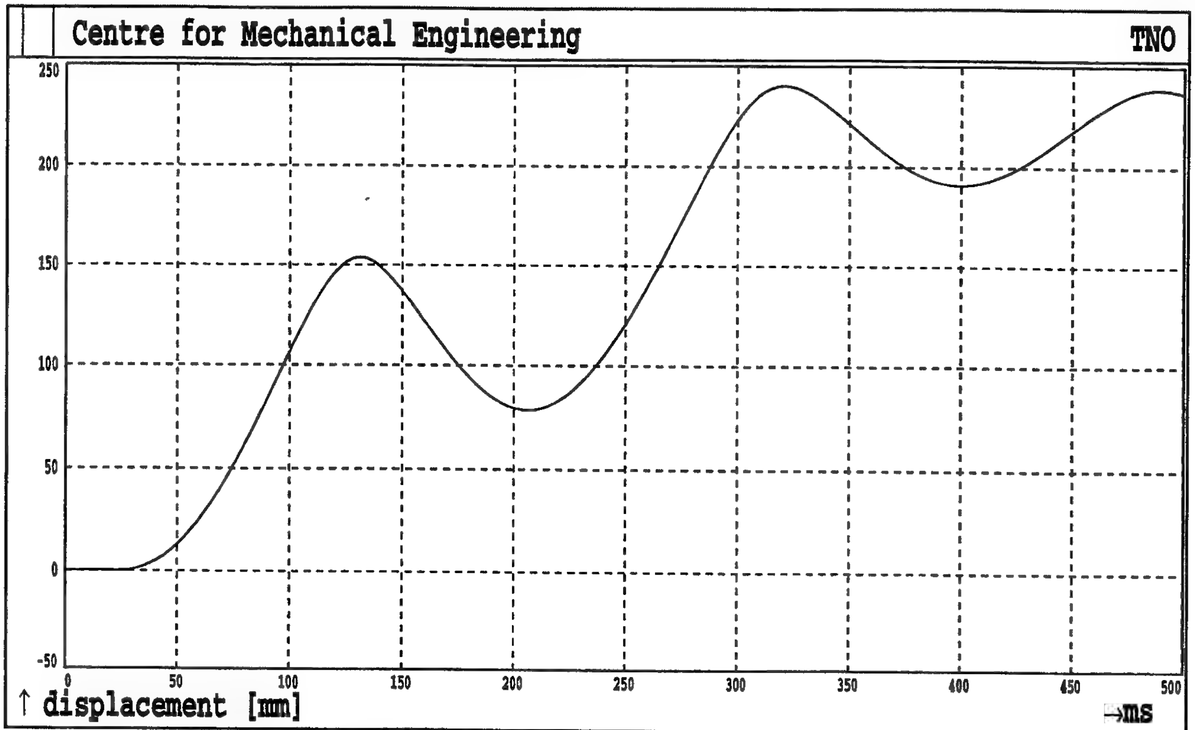


Fig.2B73. Shot 2 Sensor A17

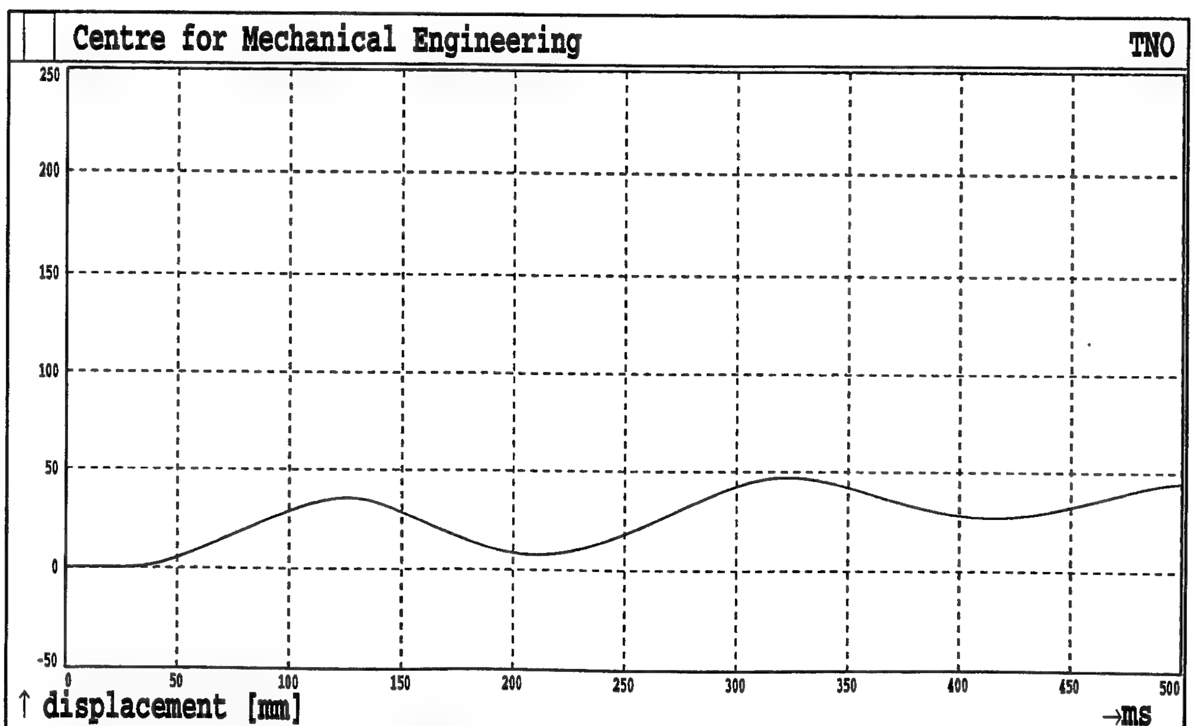


Fig.2B74. Shot 2 Sensor A18

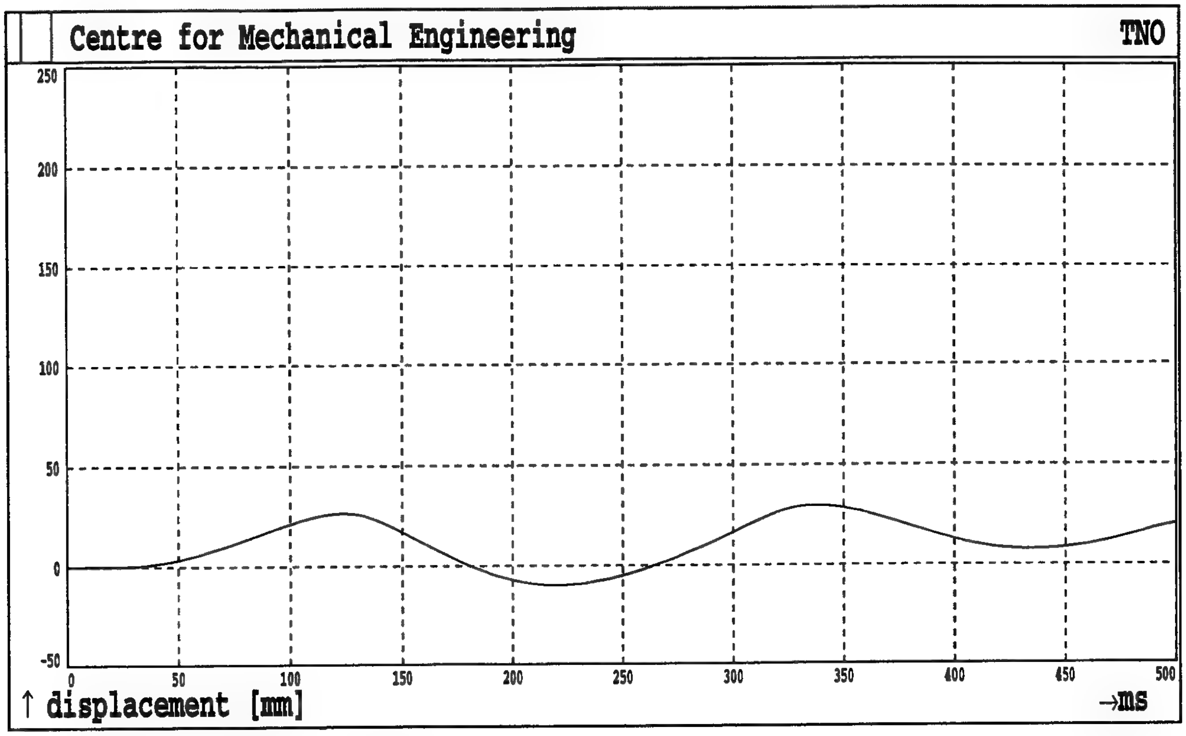


Fig.2B75. Shot 2 Sensor A19

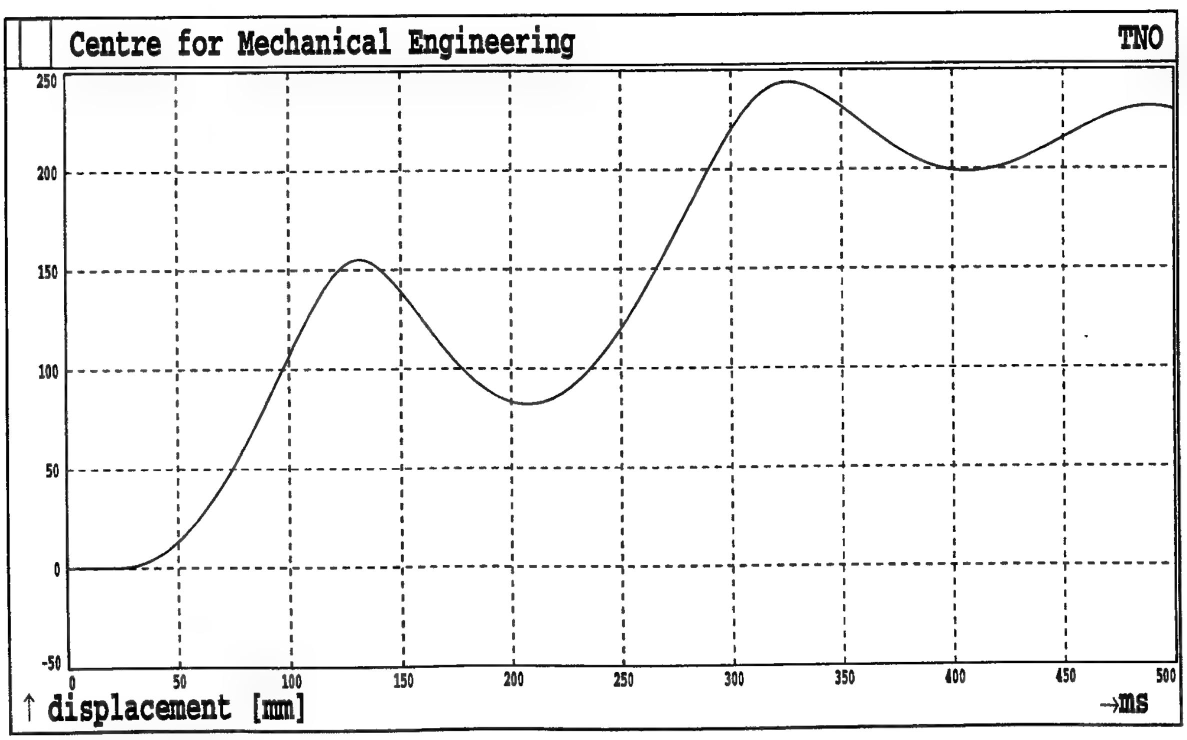


Fig.2B76. Shot 2 Sensor A20

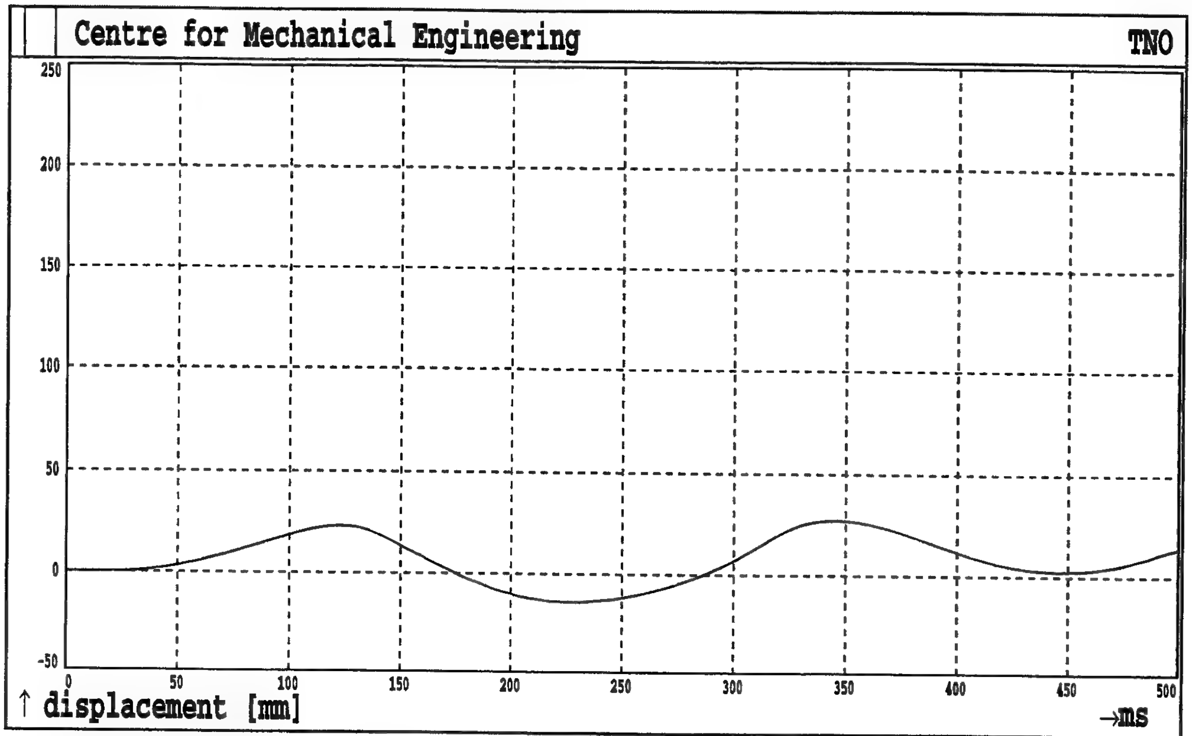


Fig.2B77. Shot 2 Sensor A21

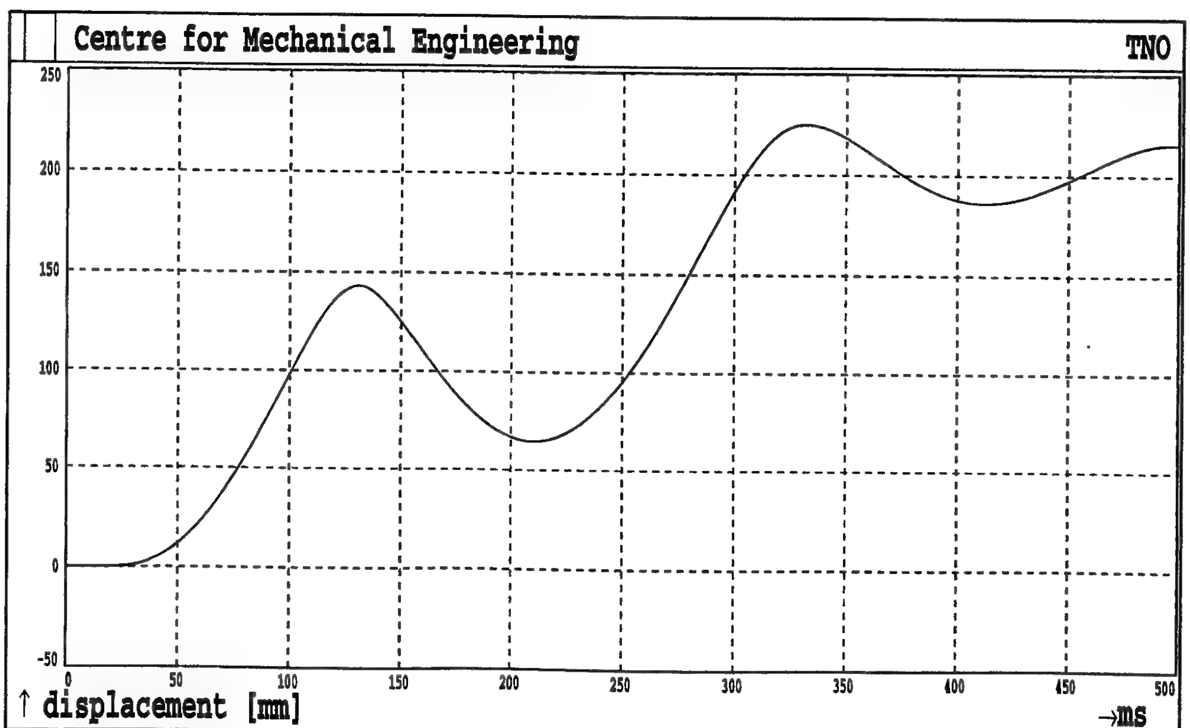


Fig.2B78. Shot 2 Sensor A22

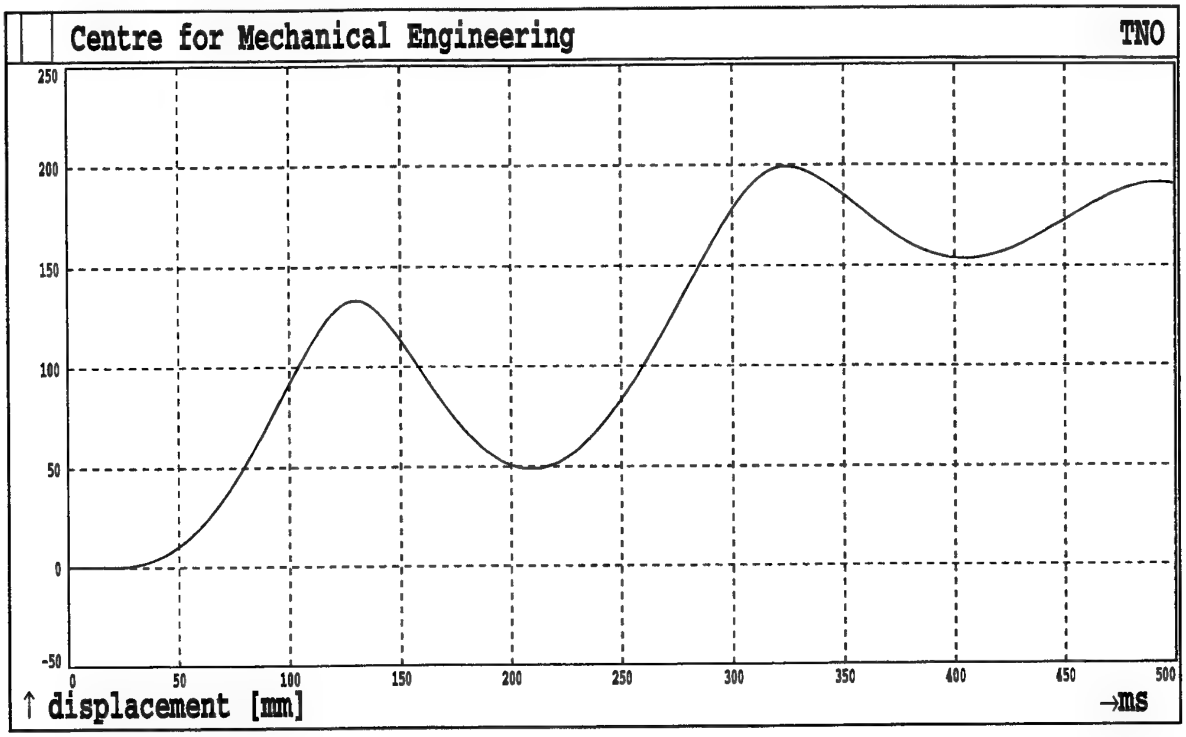


Fig.2B79. Shot 2 Sensor A23

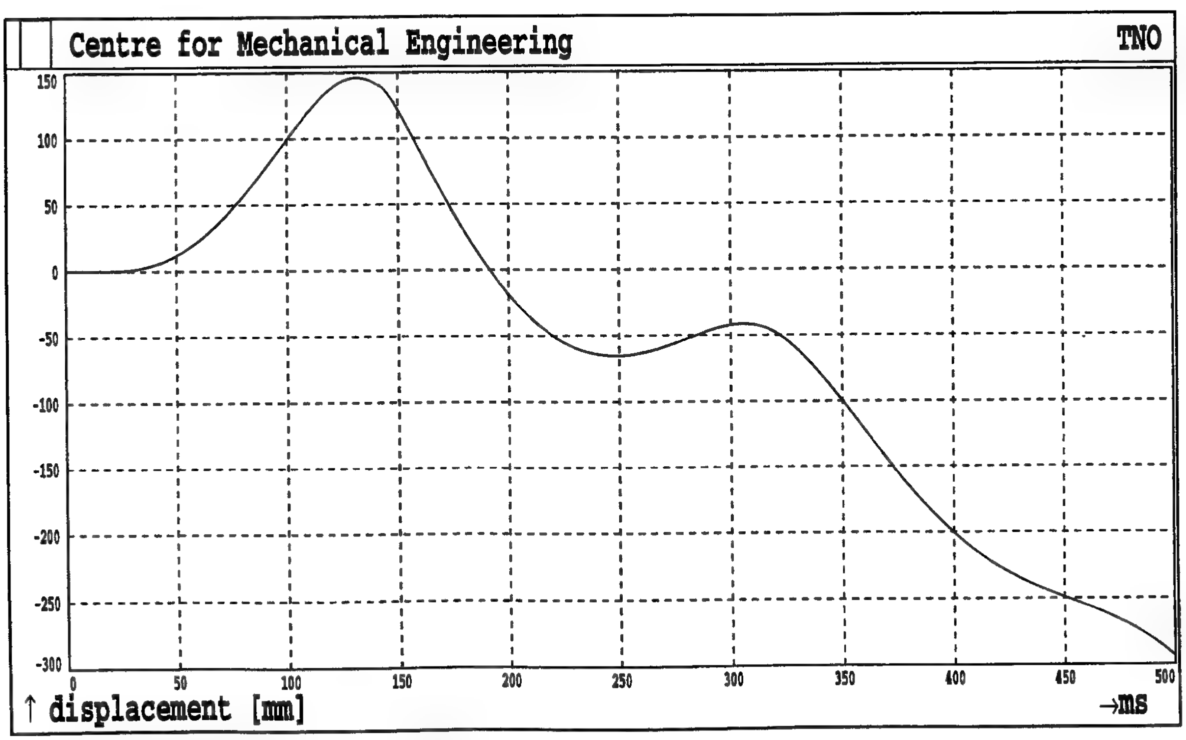


Fig.2B80. Shot 2 Sensor A24

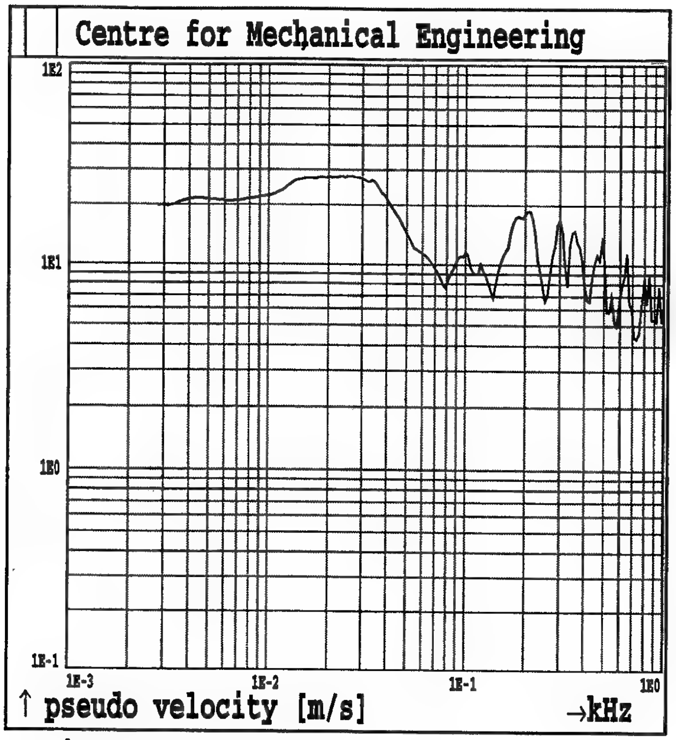


Fig.2B81. Shot 2 Sensor A1

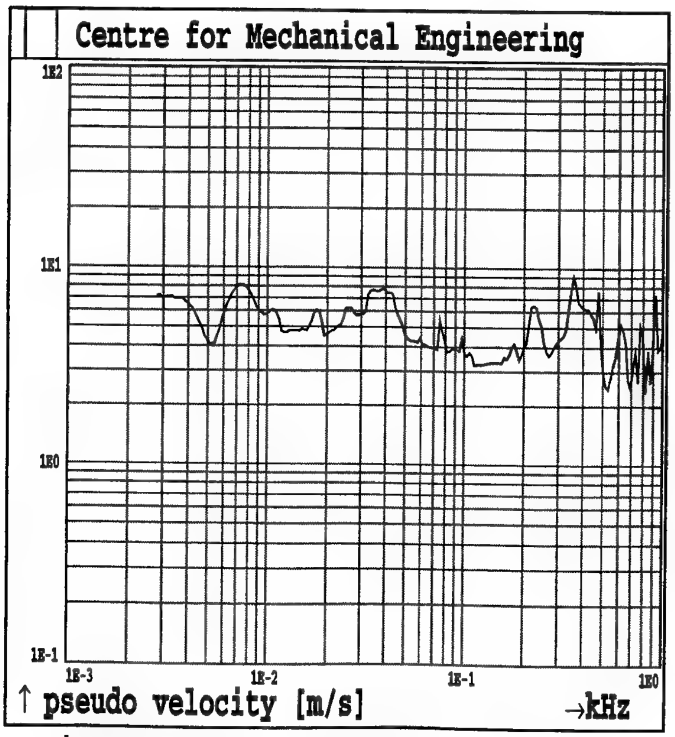


Fig.2B82. Shot 2 Sensor A2

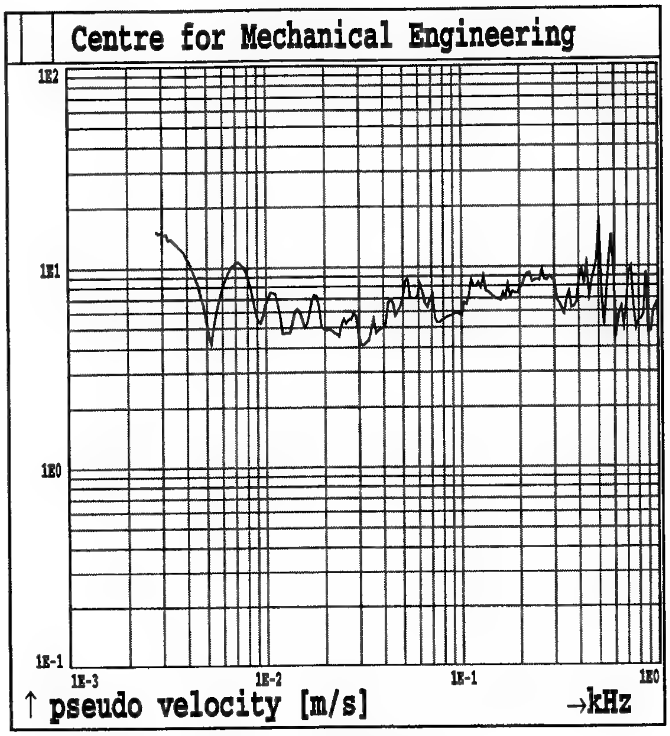


Fig.2B83. Shot 2 Sensor A3

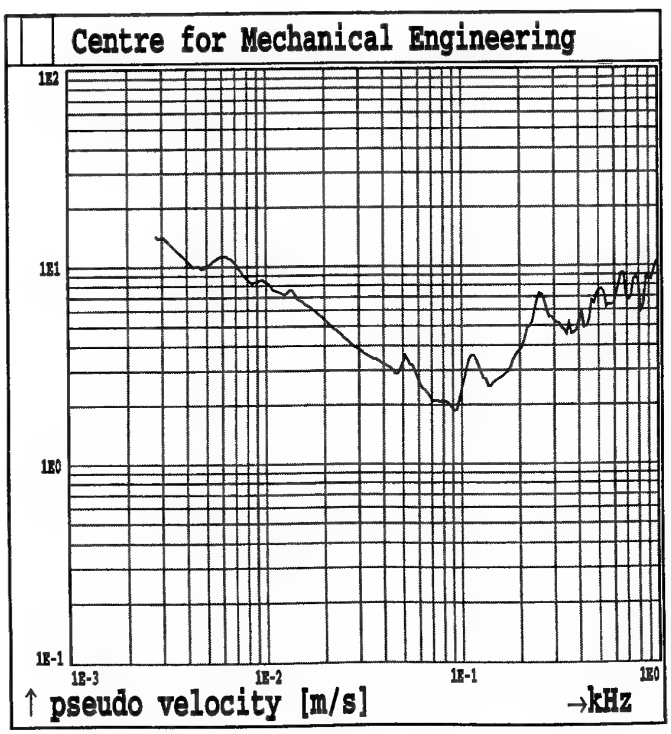


Fig.2B84. Shot 2 Sensor A4

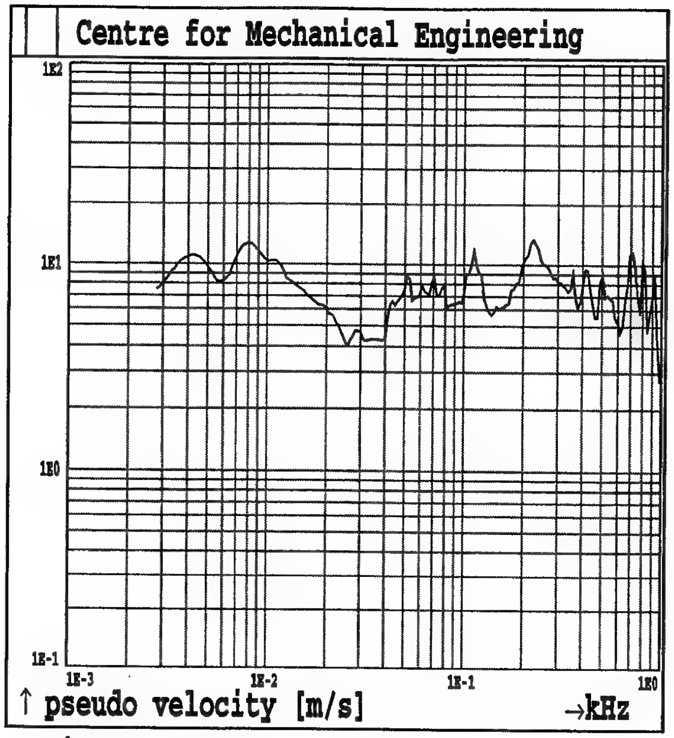


Fig.2B85. Shot 2 Sensor A5

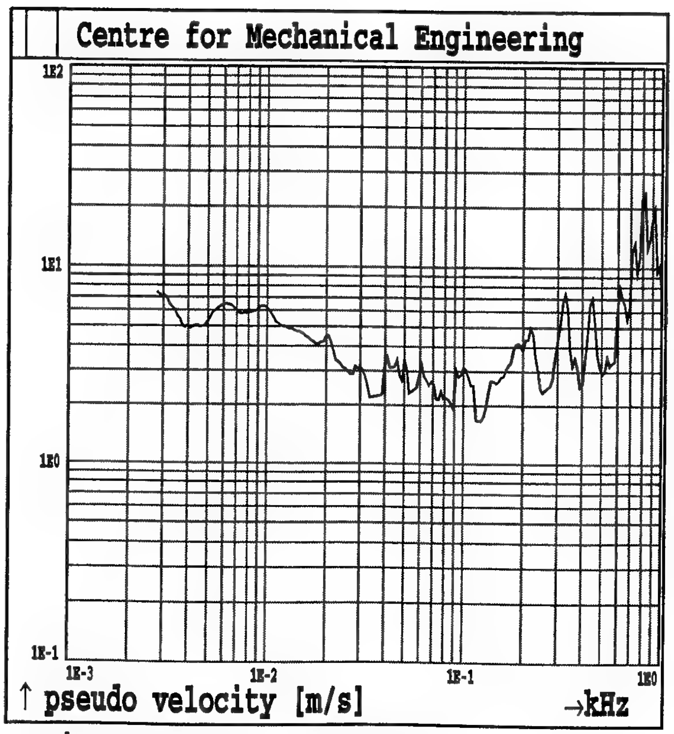


Fig.2B86. Shot 2 Sensor A6

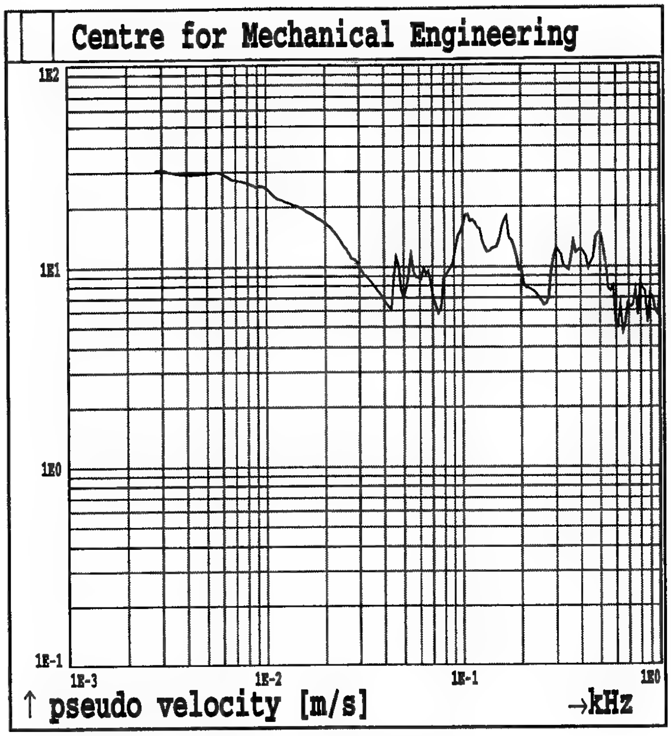


Fig.2B87. Shot 2 Sensor A7

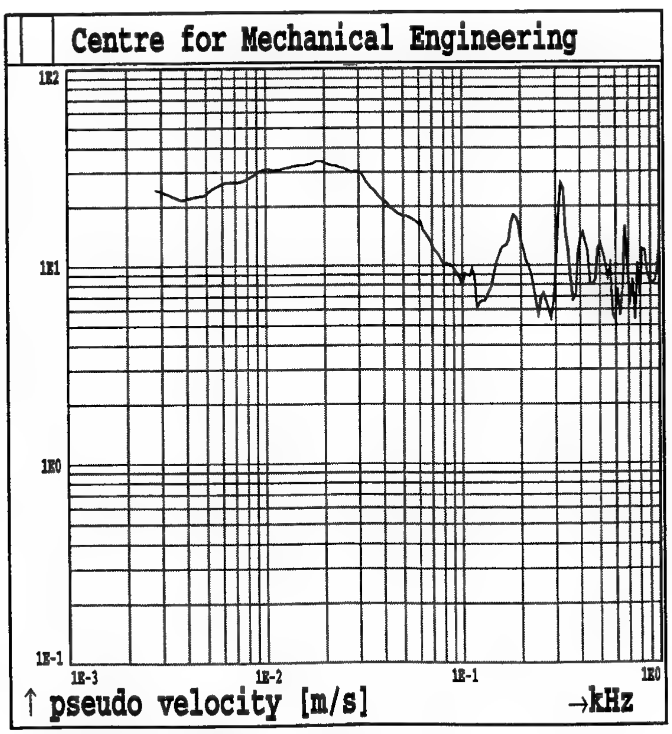


Fig.2B88. Shot 2 Sensor A8

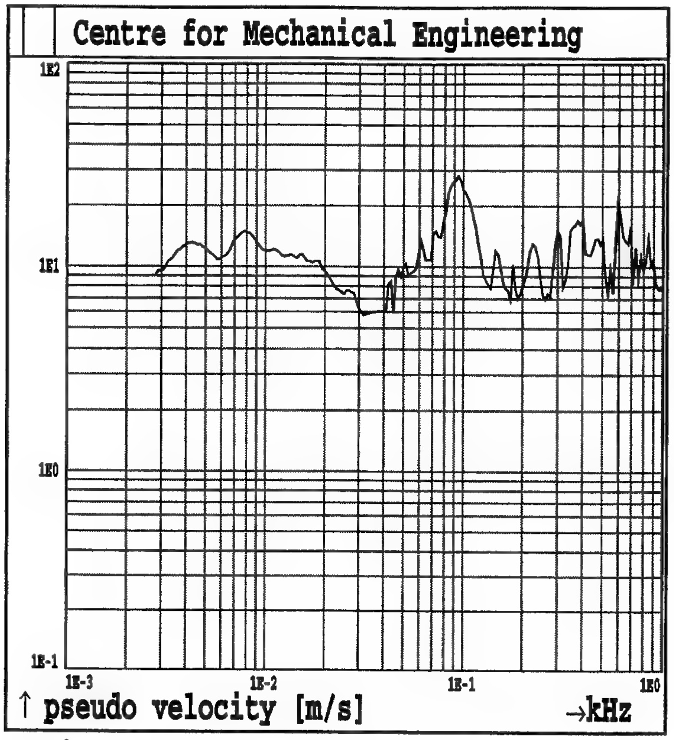


Fig.2B89. Shot 2 Sensor A9

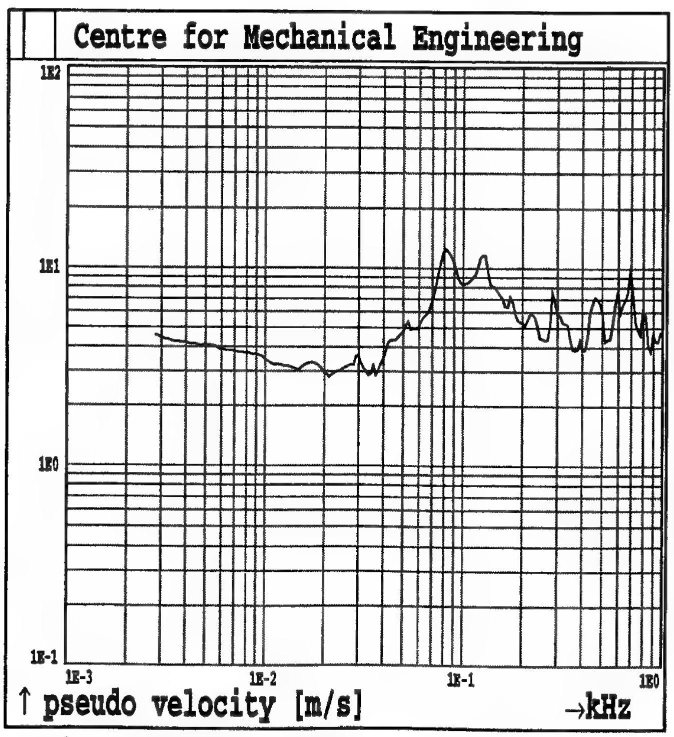


Fig.2B90. Shot 2 Sensor A10

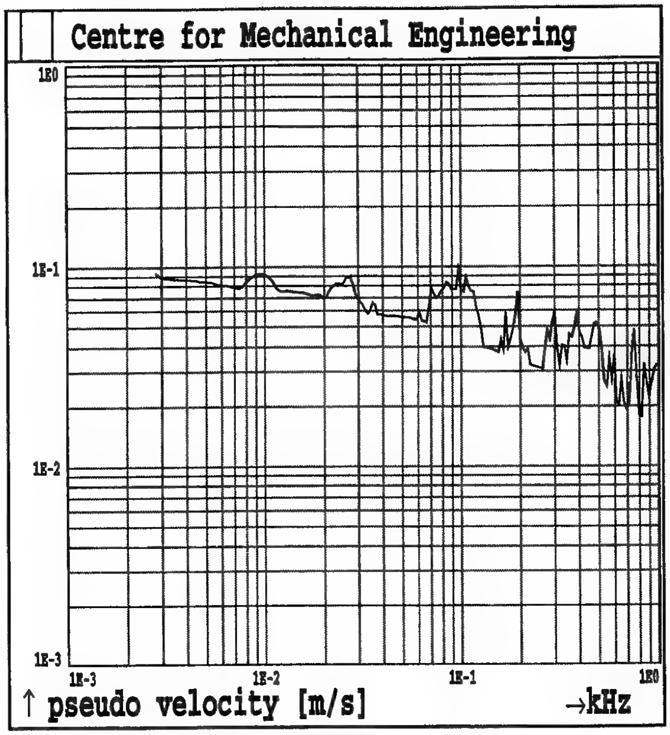


Fig.2B91. Shot 2 Sensor A11

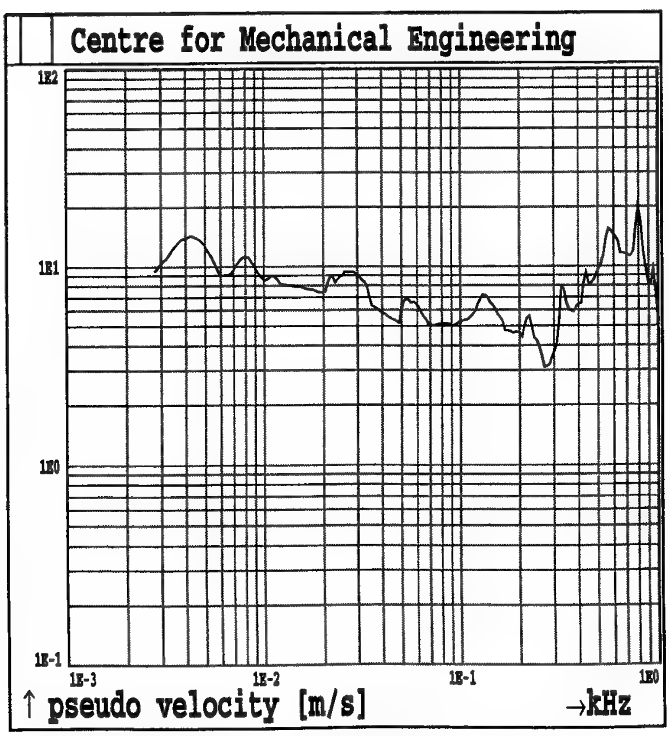


Fig.2B92. Shot 2 Sensor A12

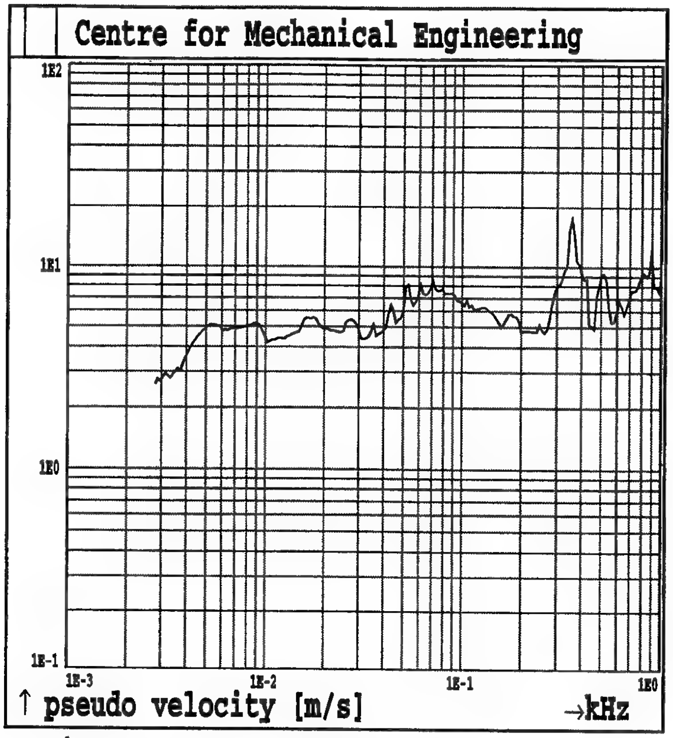


Fig.2B93. Shot 2 Sensor A13

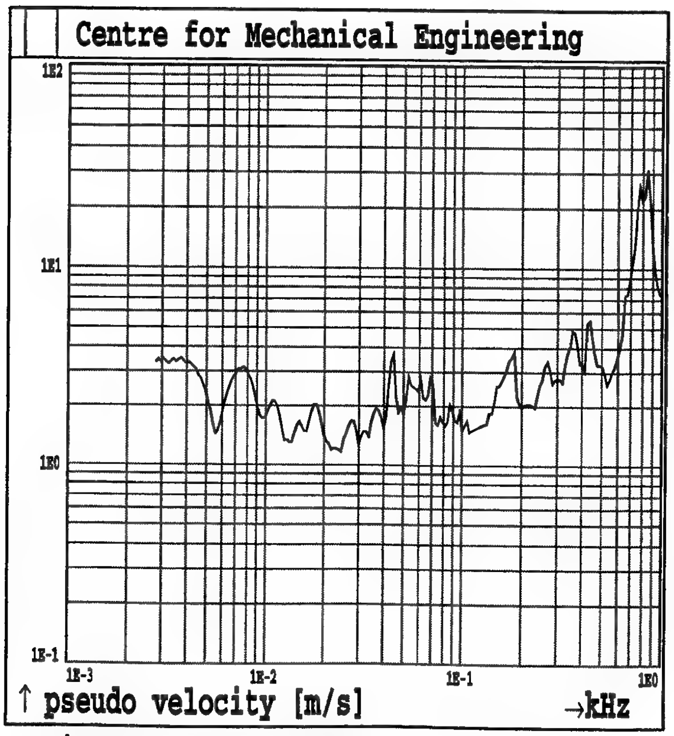


Fig.2B94. Shot 2 Sensor A14

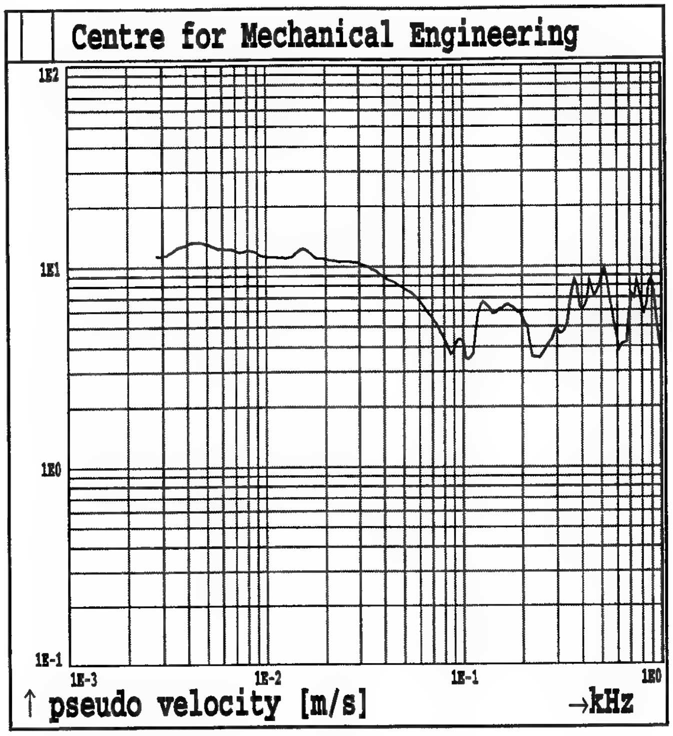


Fig.2B95. Shot 2 Sensor A15

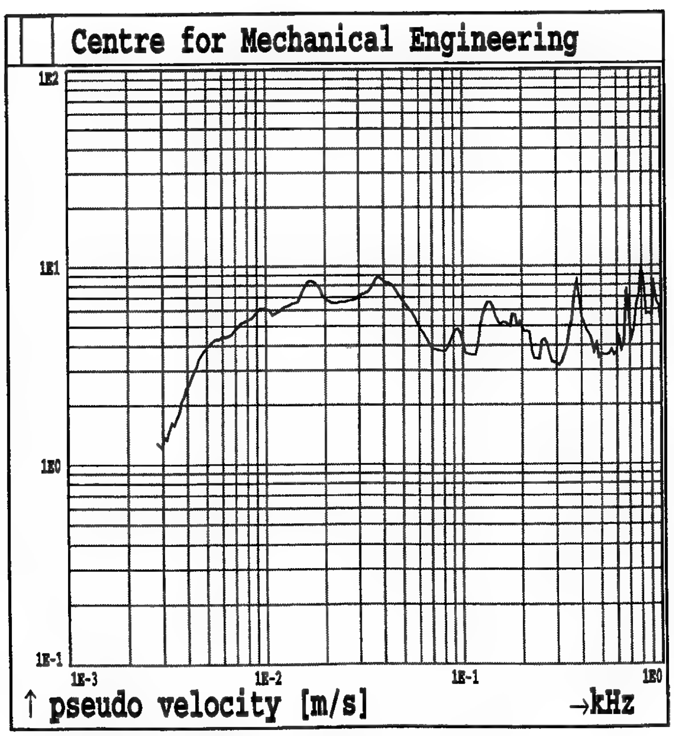


Fig.2B96. Shot 2 Sensor A16

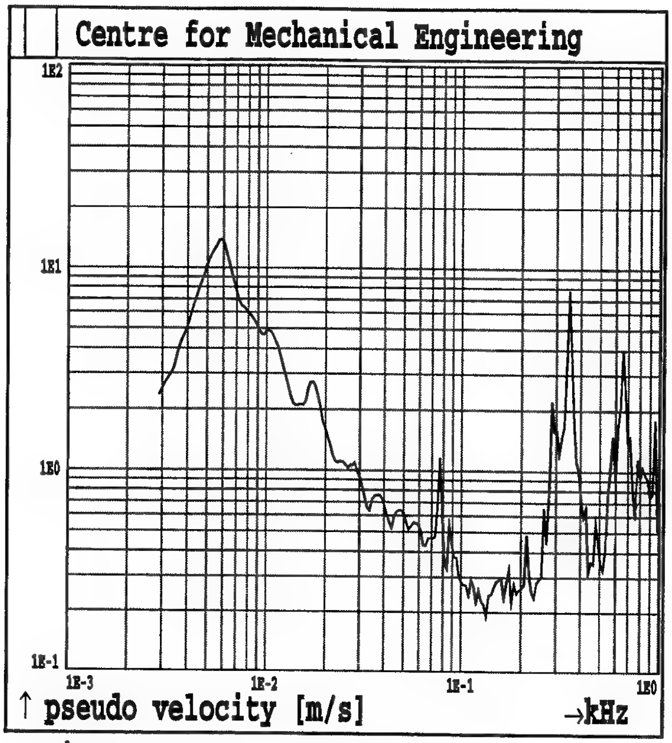


Fig.2B97. Shot 2 Sensor A17

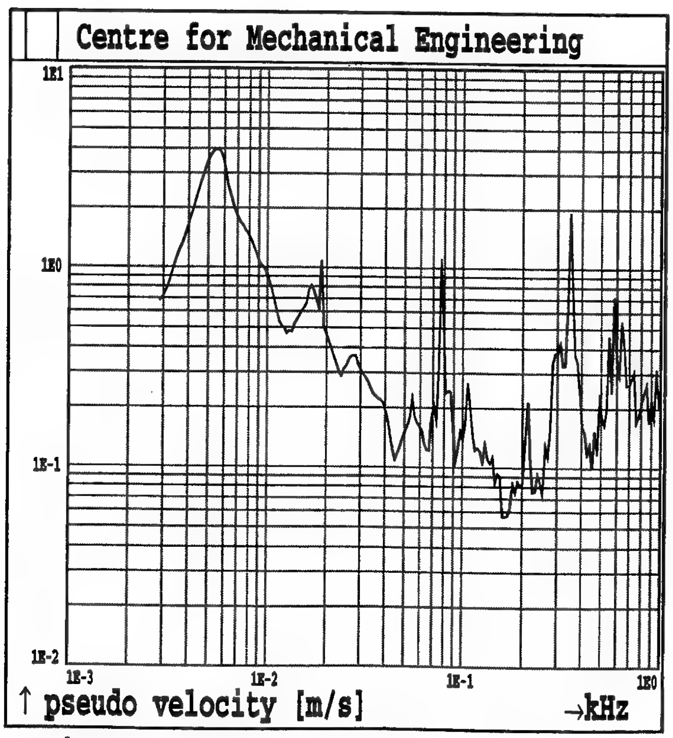


Fig.2B98. Shot 2 Sensor A18

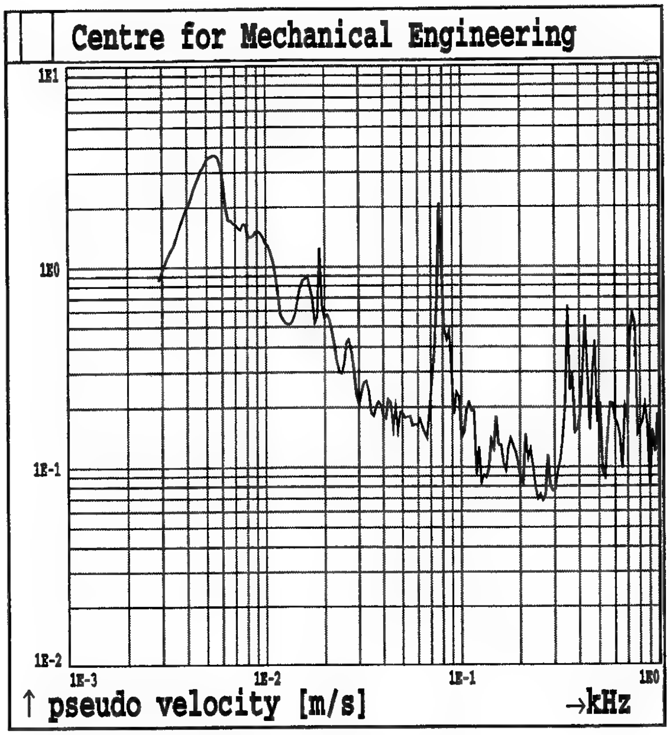


Fig.2B99. Shot 2 Sensor A19

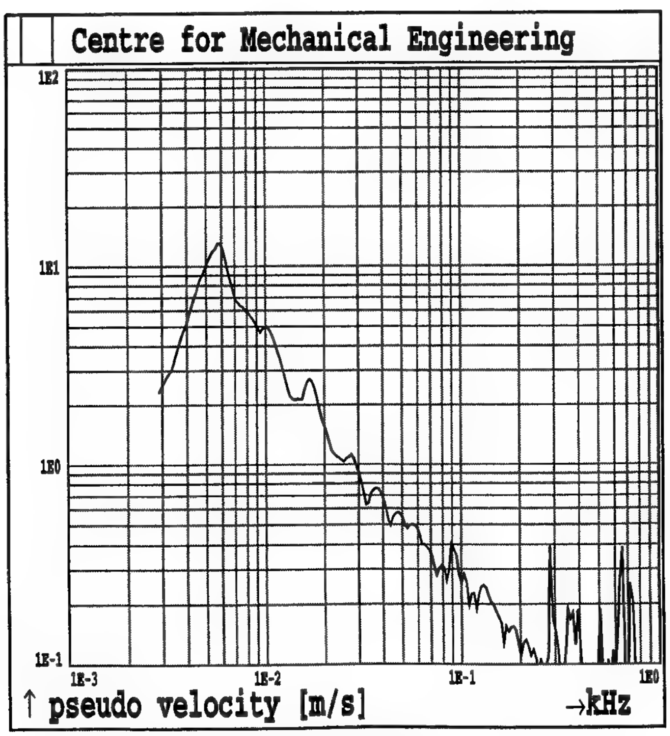


Fig.2B100. Shot 2 Sensor A20

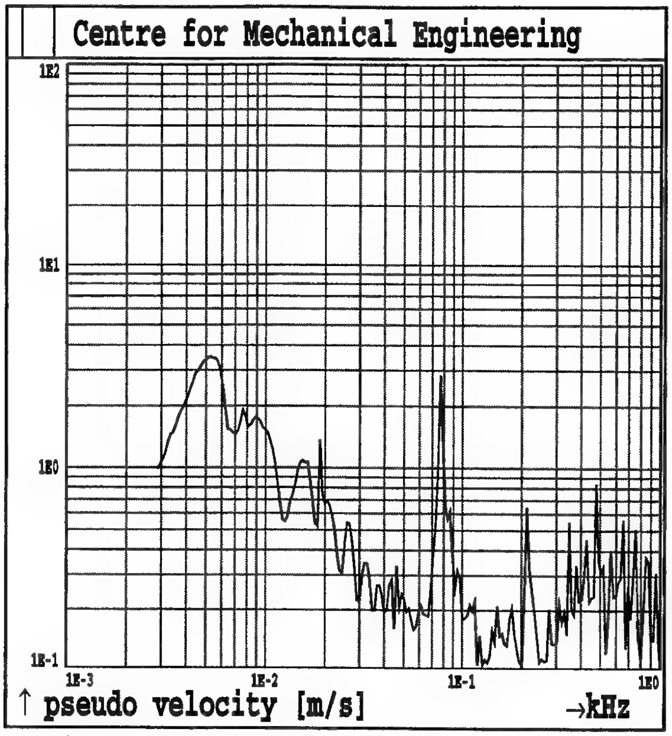


Fig.2B101. Shot 2 Sensor A21

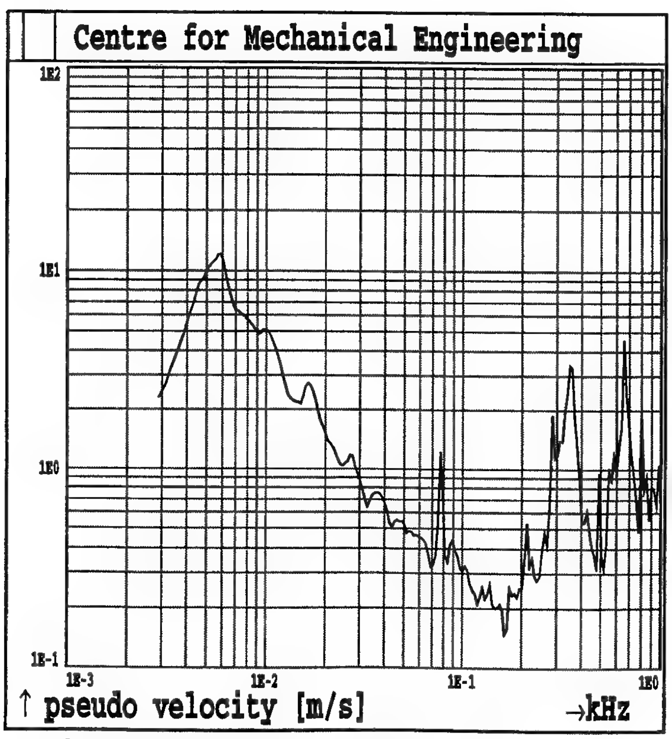


Fig.2B102. Shot 2 Sensor A22

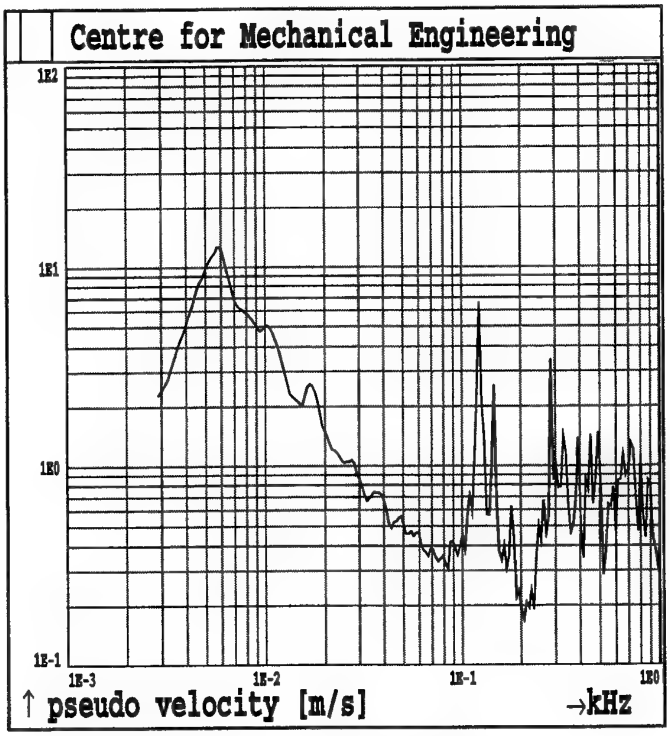


Fig.2B103. Shot 2 Sensor A23

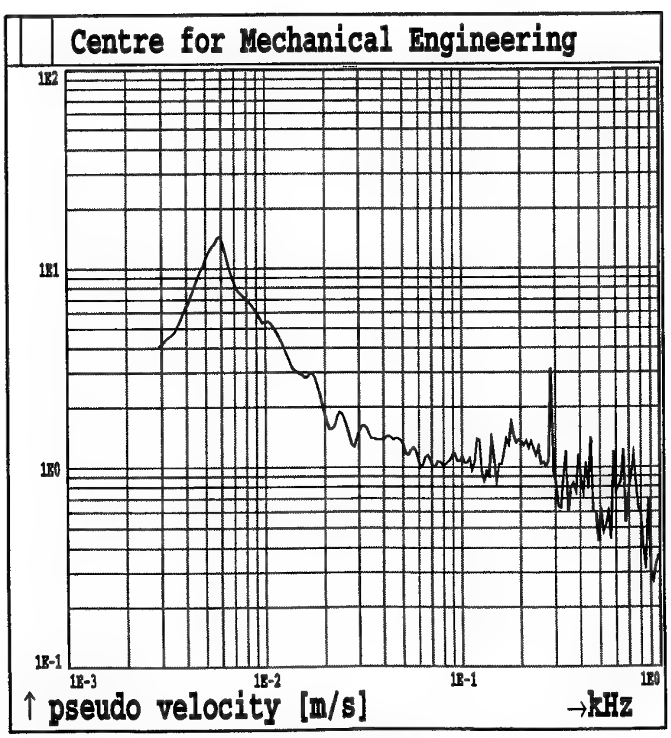


Fig.2B104. Shot 2 Sensor A24

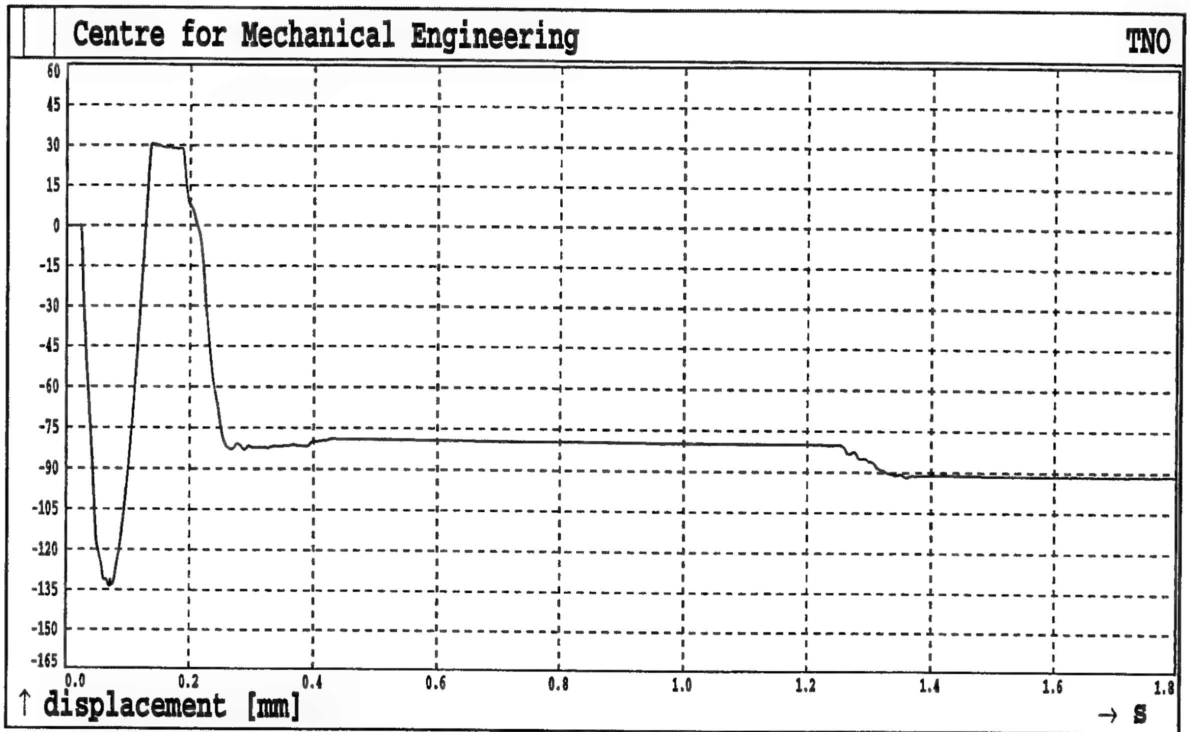


Fig.3B1. Shot 3 Sensor R1

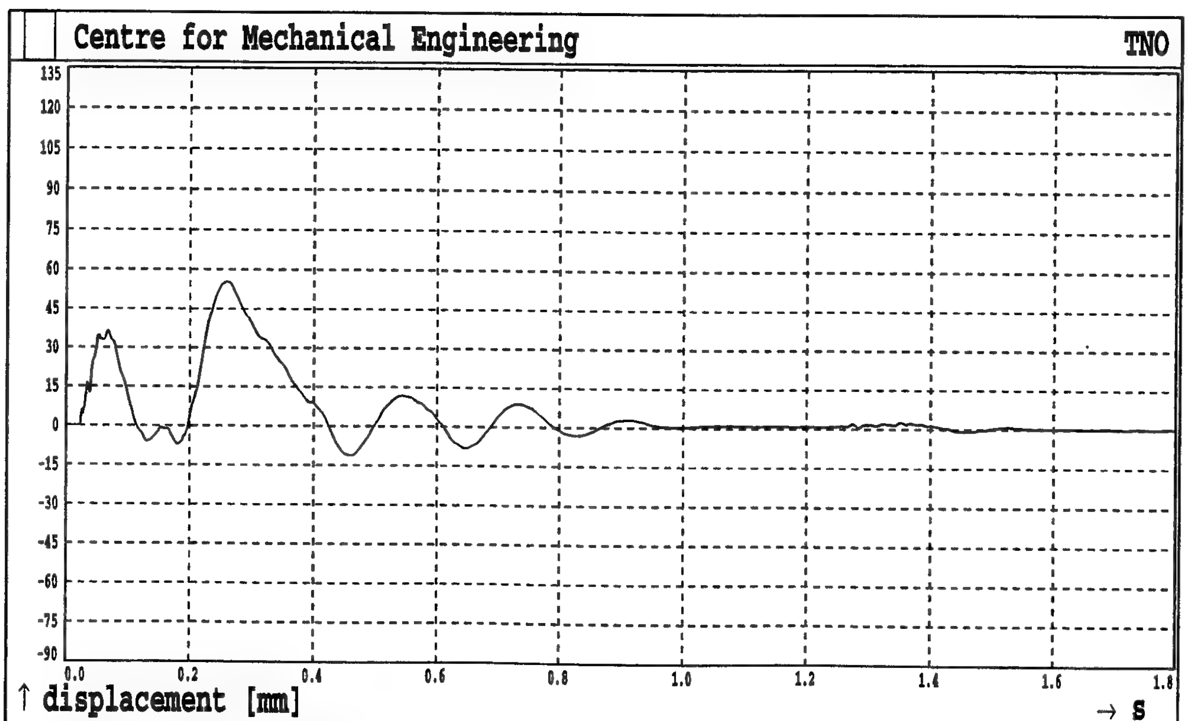


Fig.3B2. Shot 3 Sensor R2

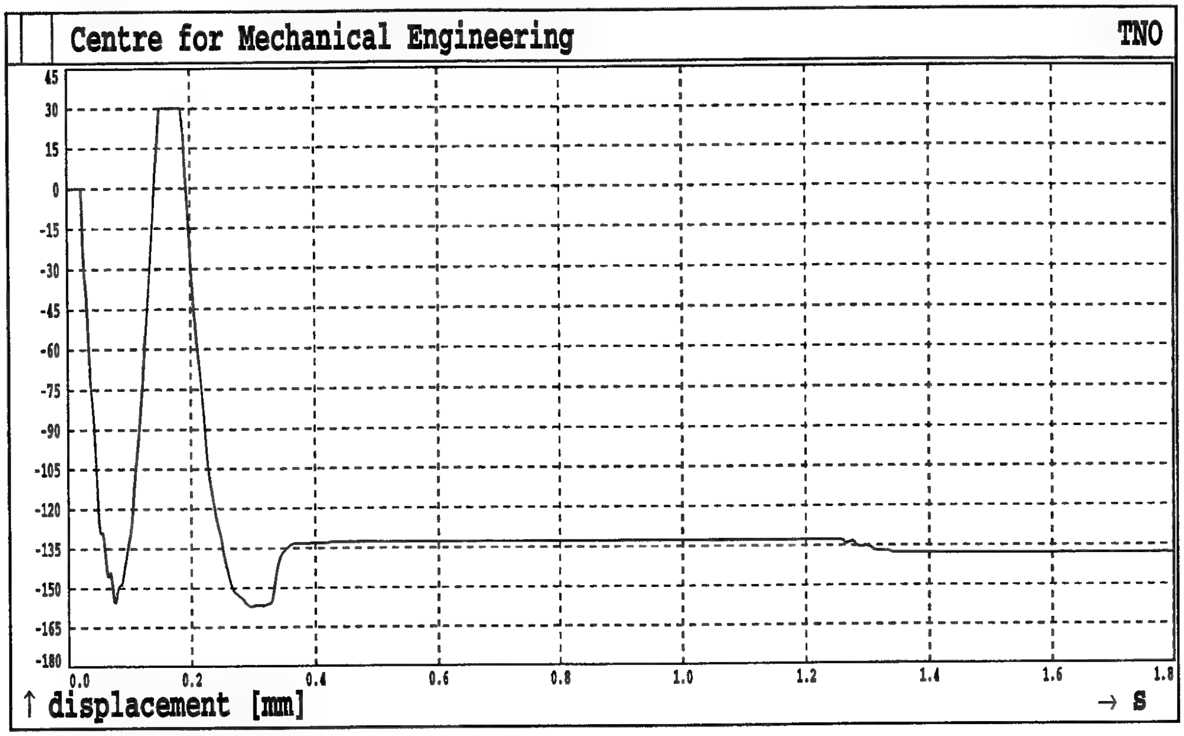


Fig.3B3. Shot 3 Sensor R3

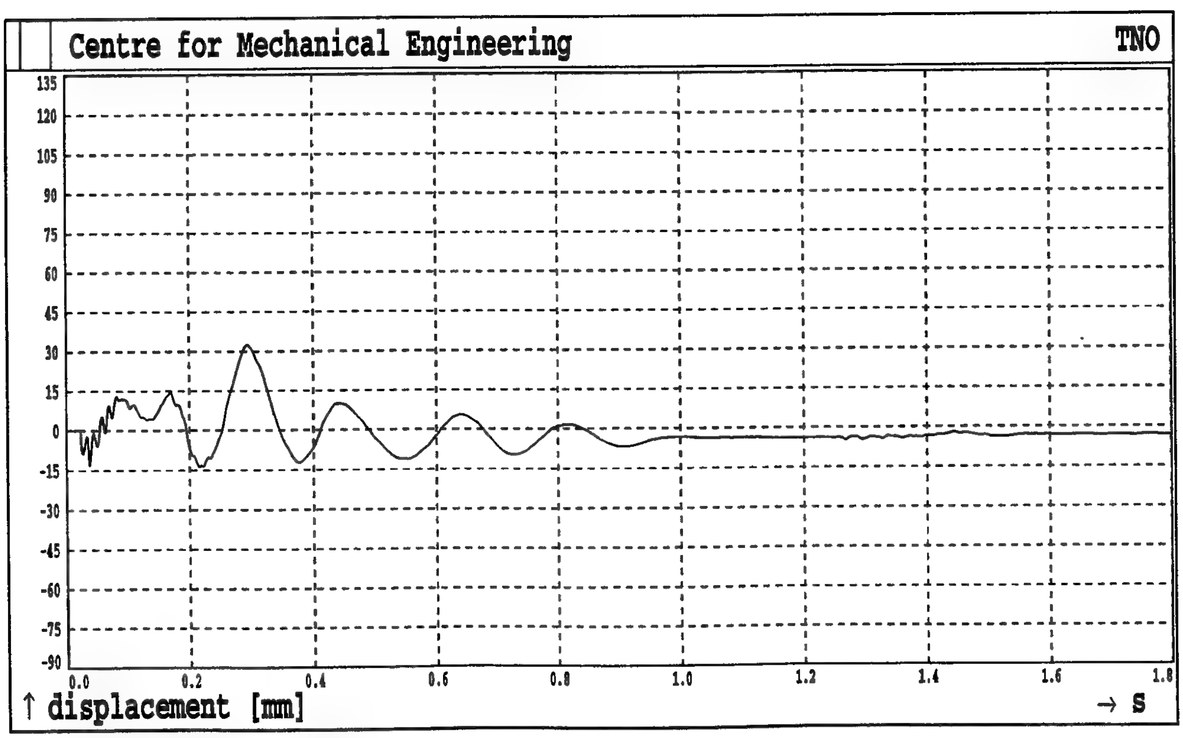


Fig.3B4. Shot 3 Sensor R4

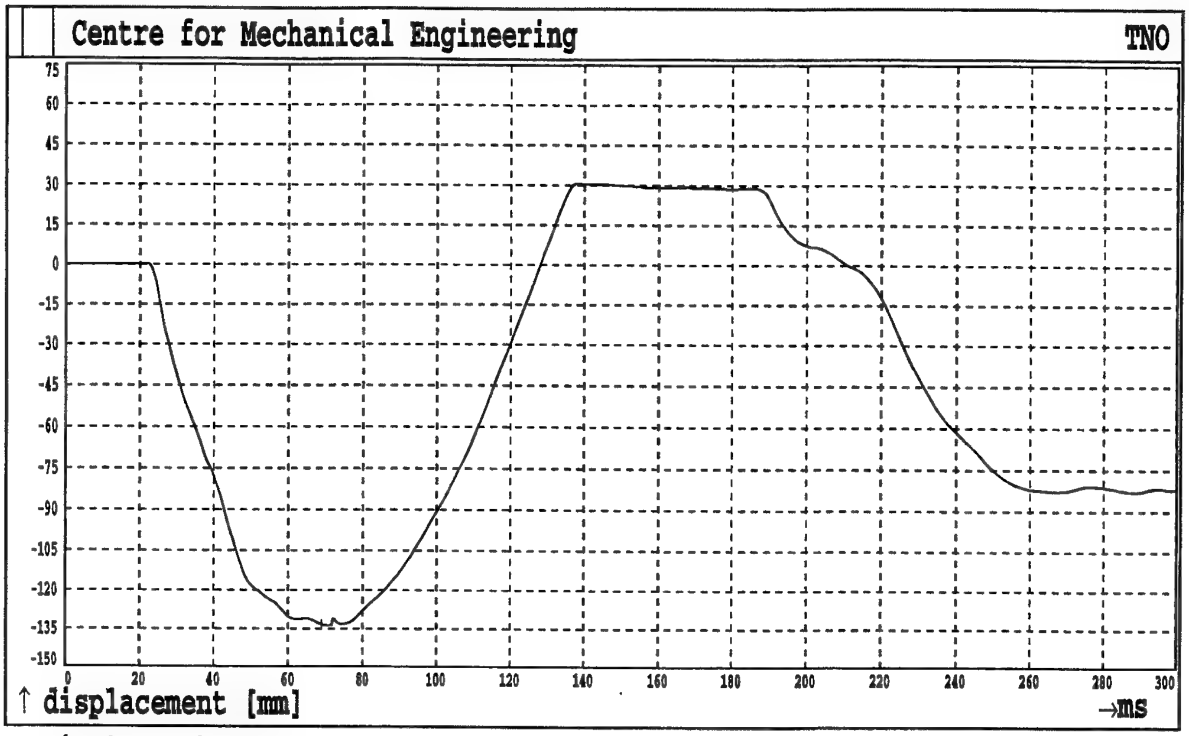


Fig.3B5. Shot 3 Sensor R1

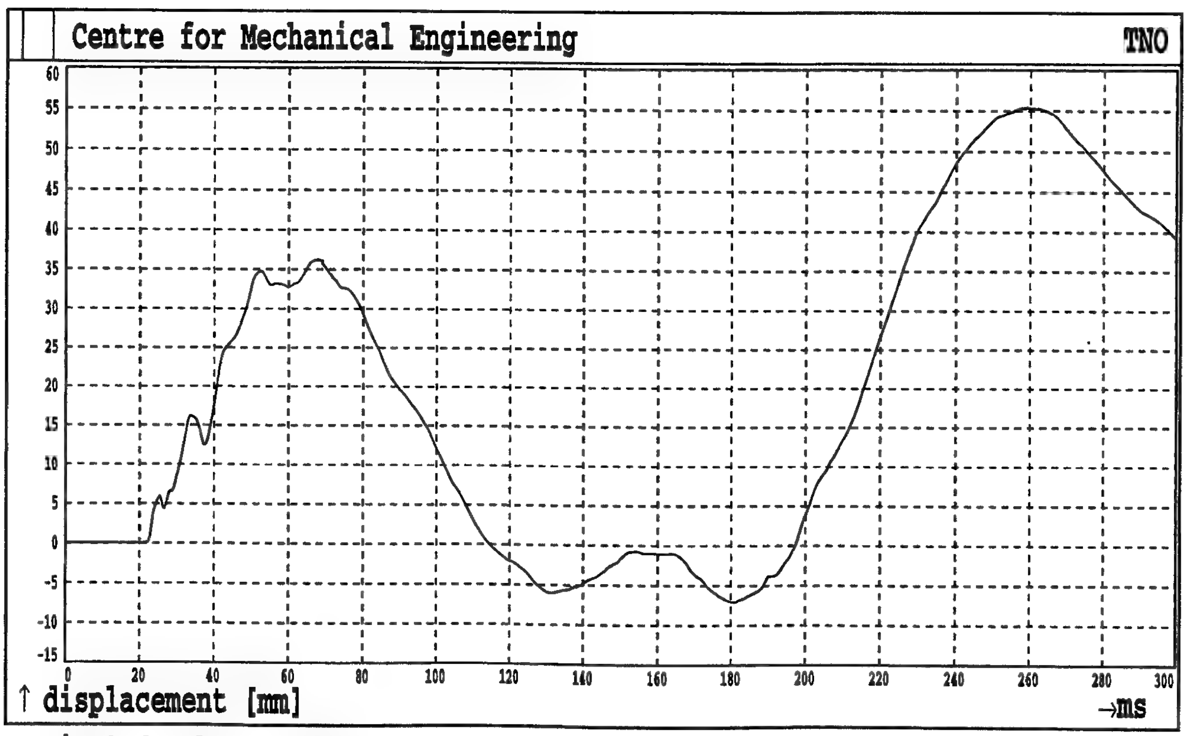


Fig.3B6. Shot 3 Sensor R2

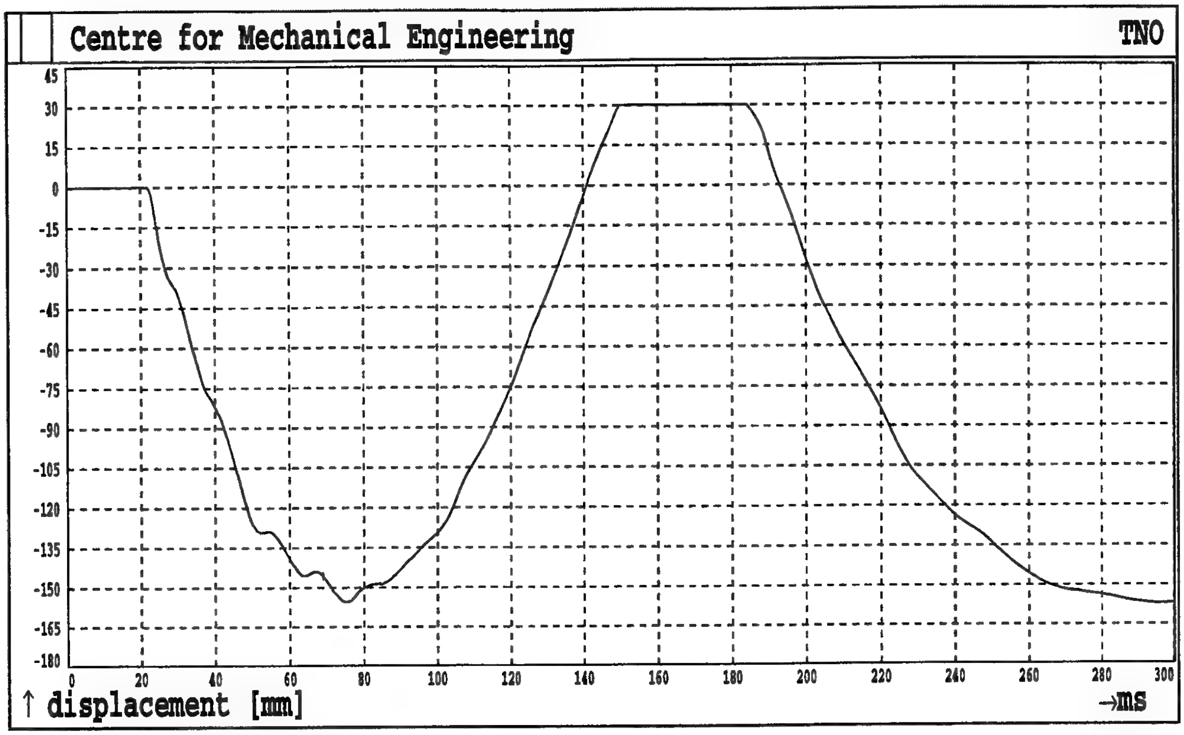


Fig.3B7. Shot 3 Sensor R3

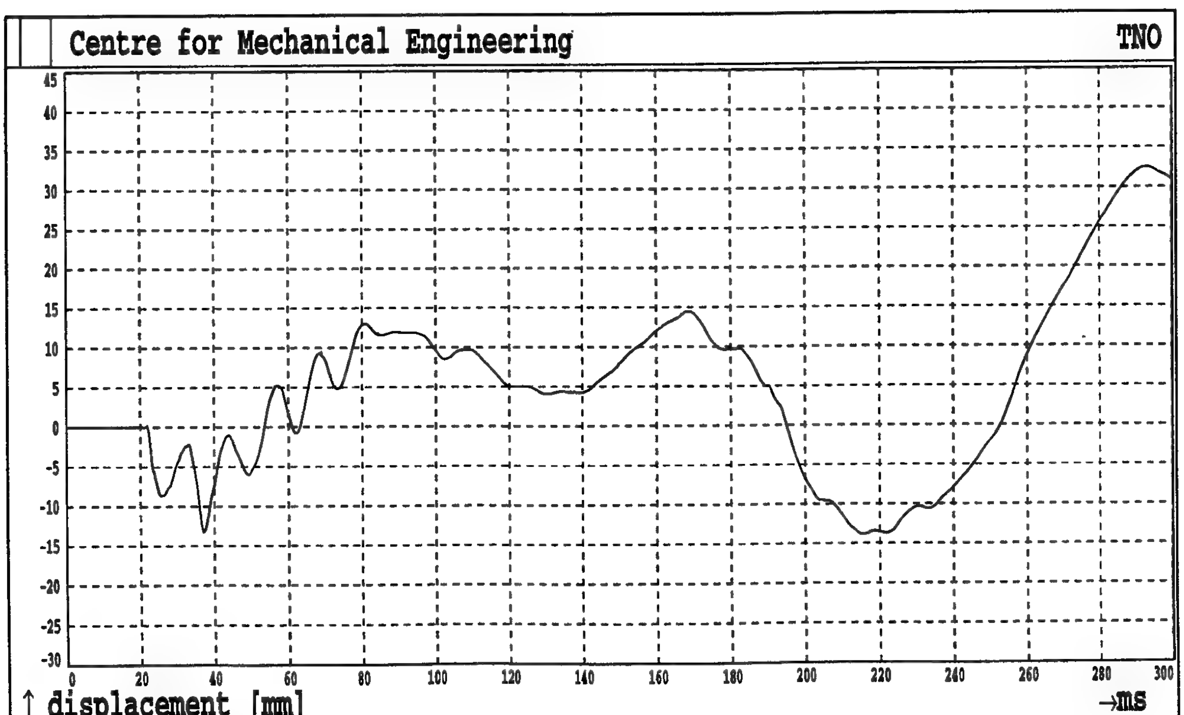


Fig.3B8. Shot 3 Sensor R4

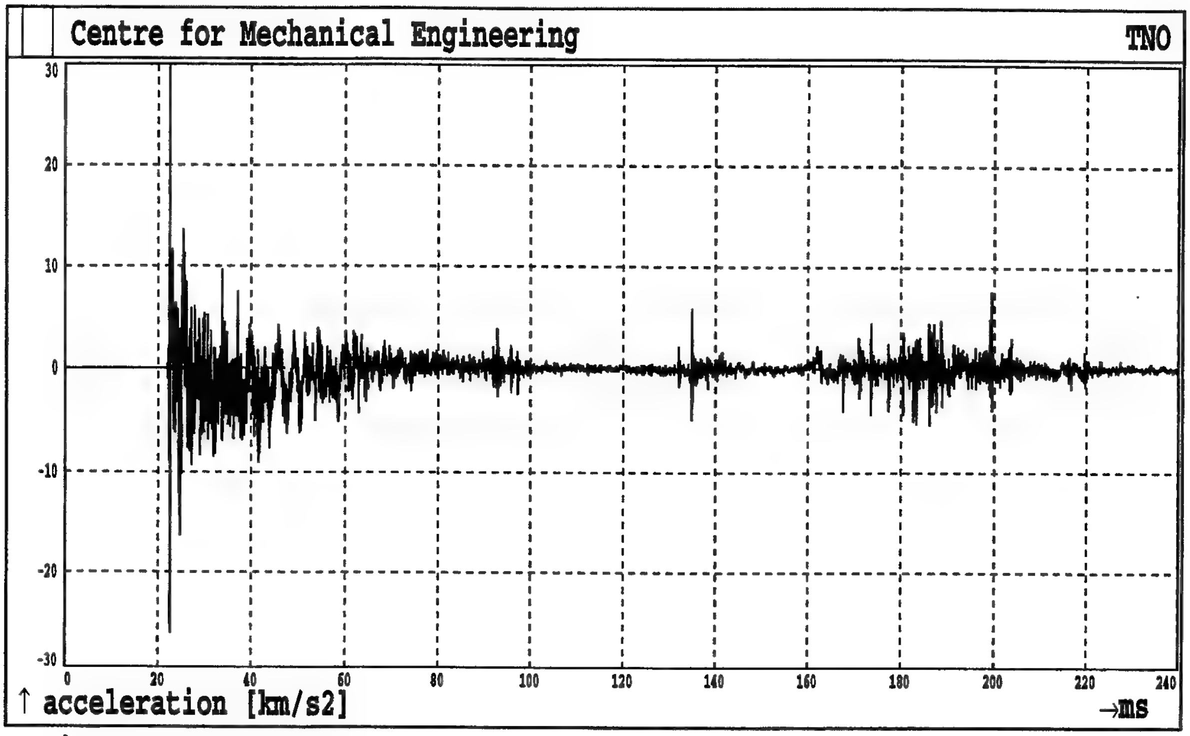


Fig.3B9. Shot 3 Sensor A1

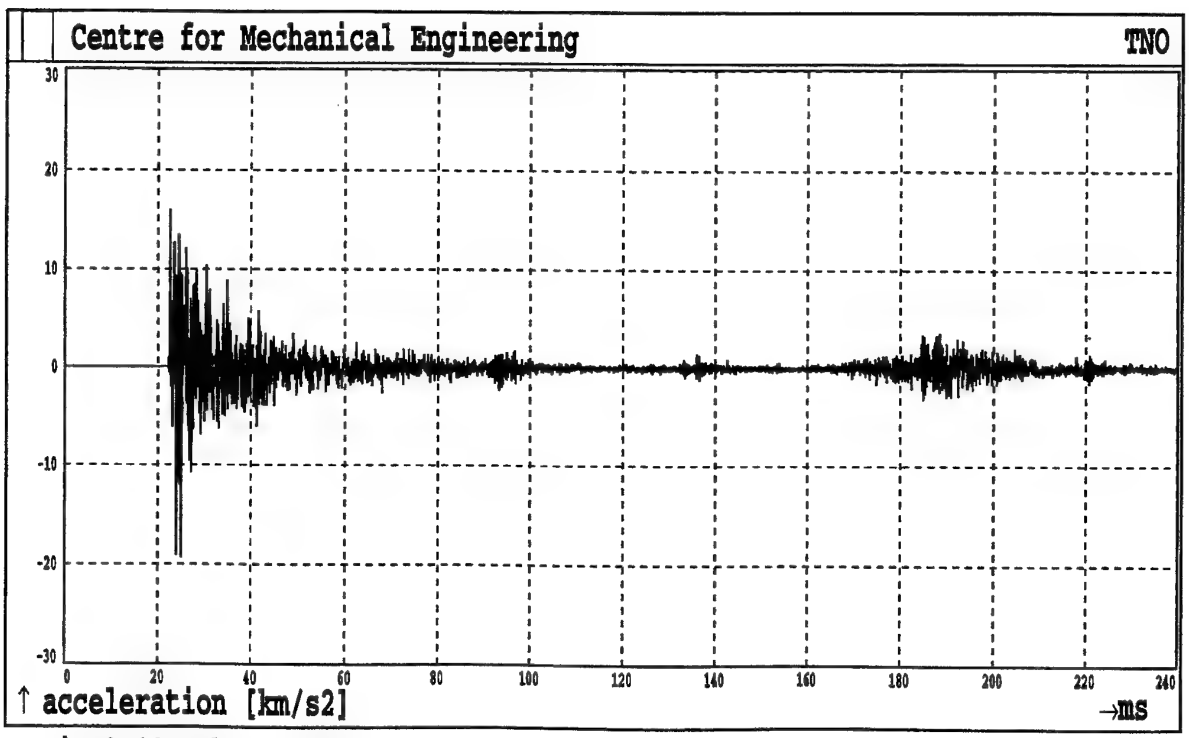


Fig.3B10. Shot 3 Sensor A2

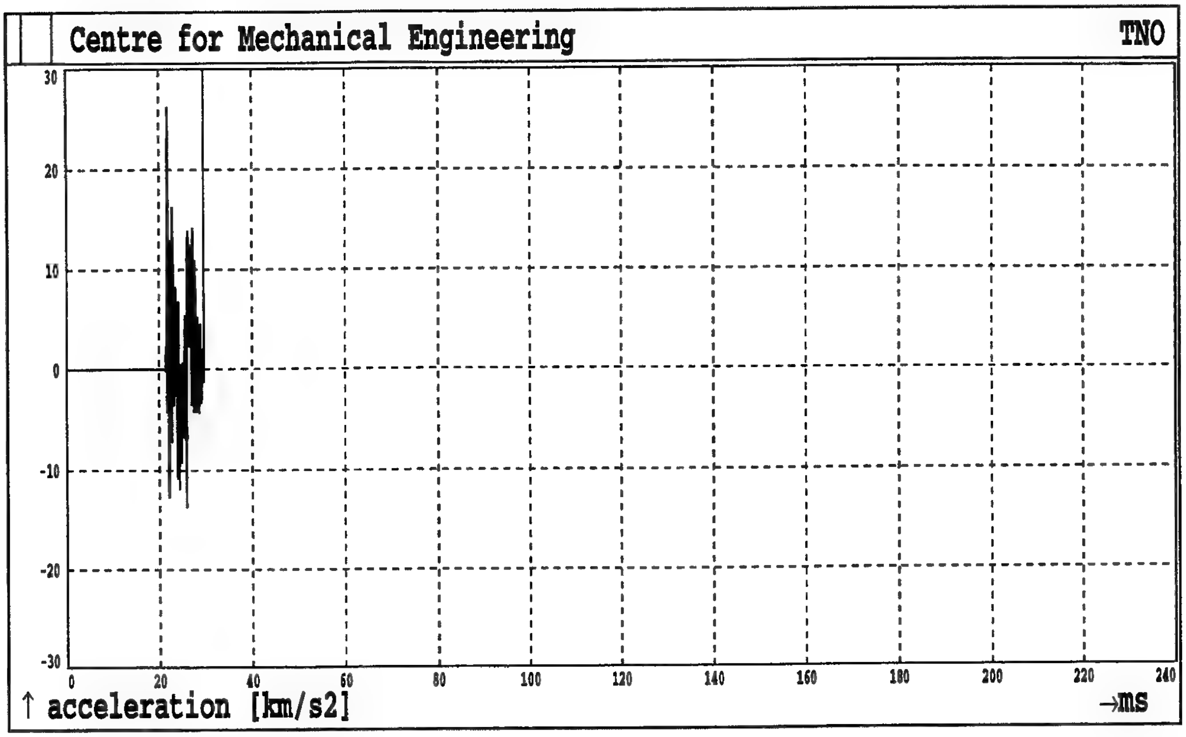


Fig.3B11. Shot 3 Sensor A3

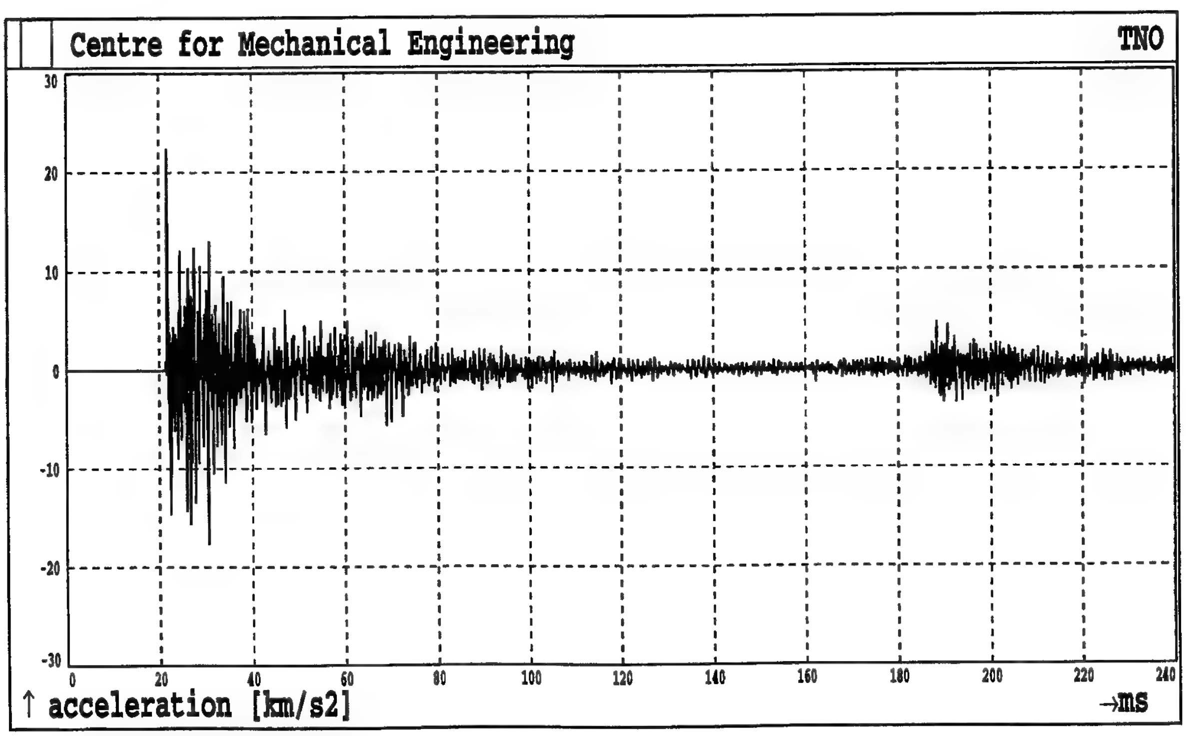


Fig.3B12. Shot 3 Sensor A4

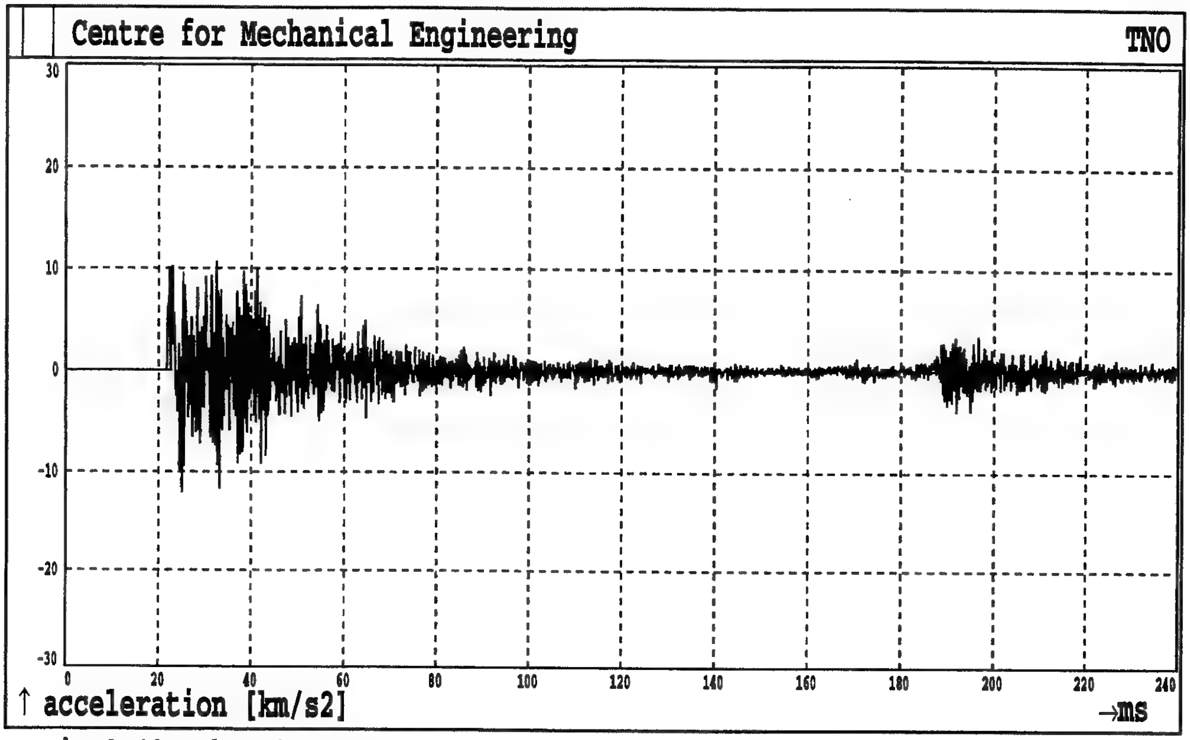


Fig.3B13. Shot 3 Sensor A5

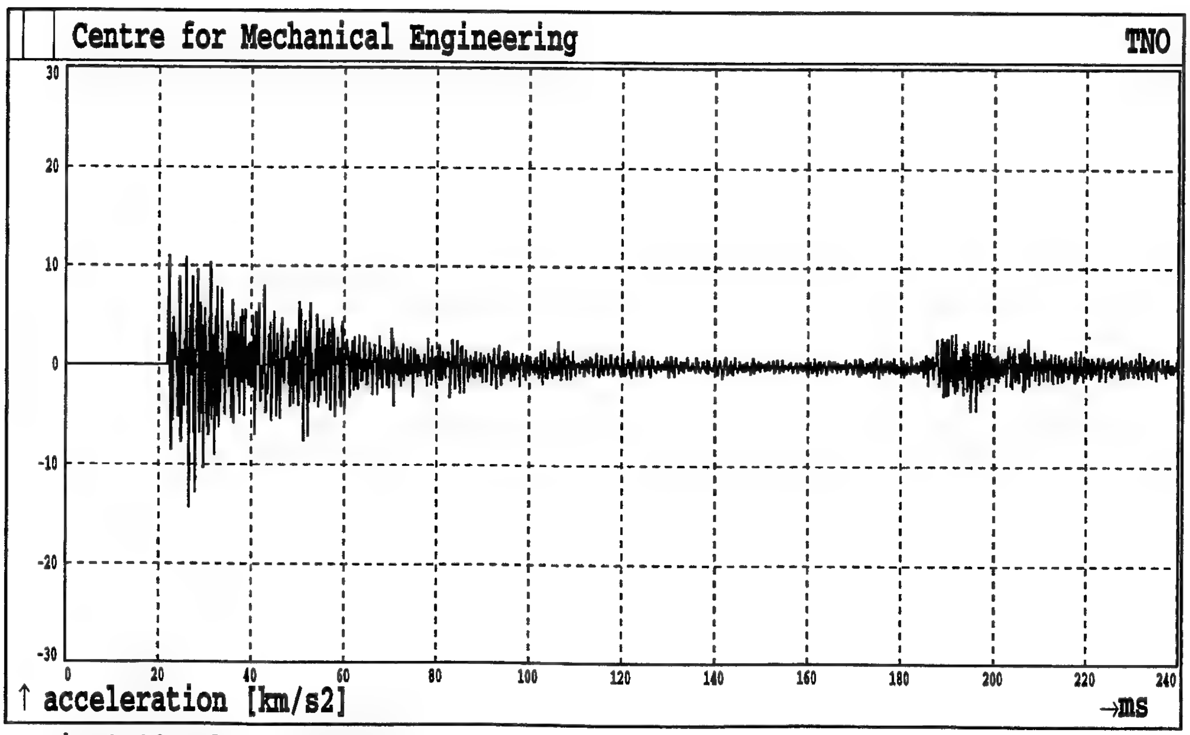


Fig.3B14. Shot 3 Sensor A6

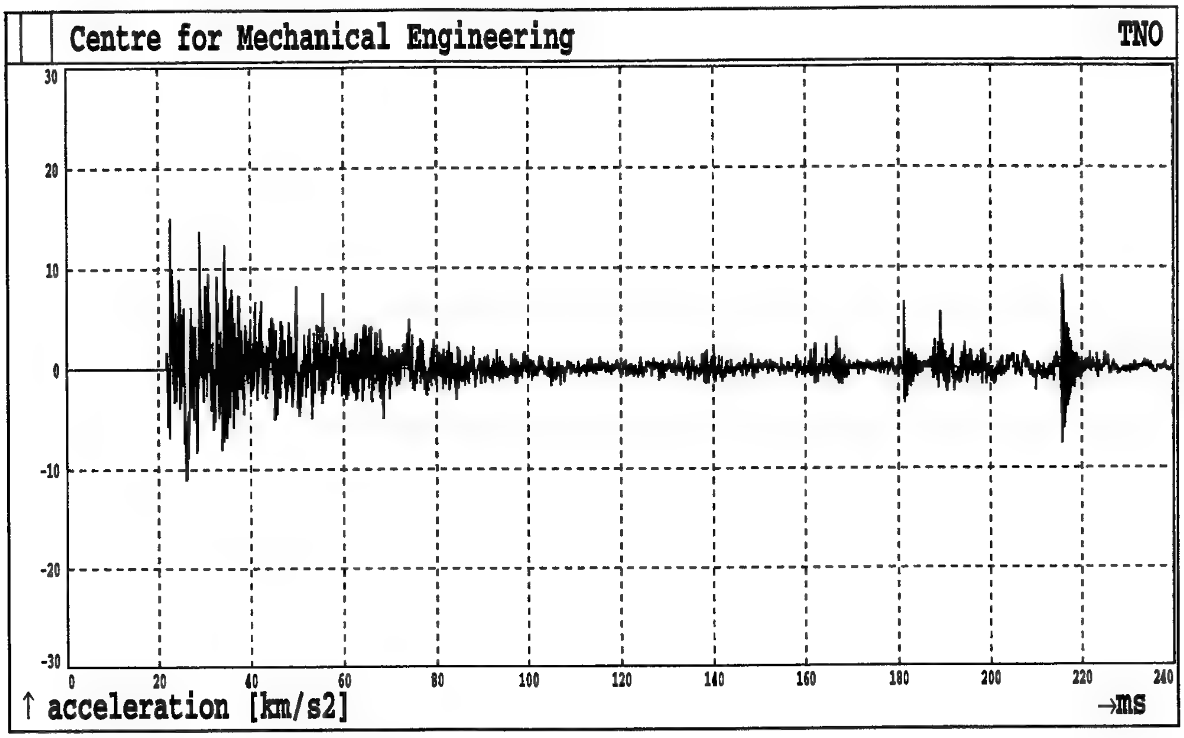


Fig.3B15. Shot 3 Sensor A7

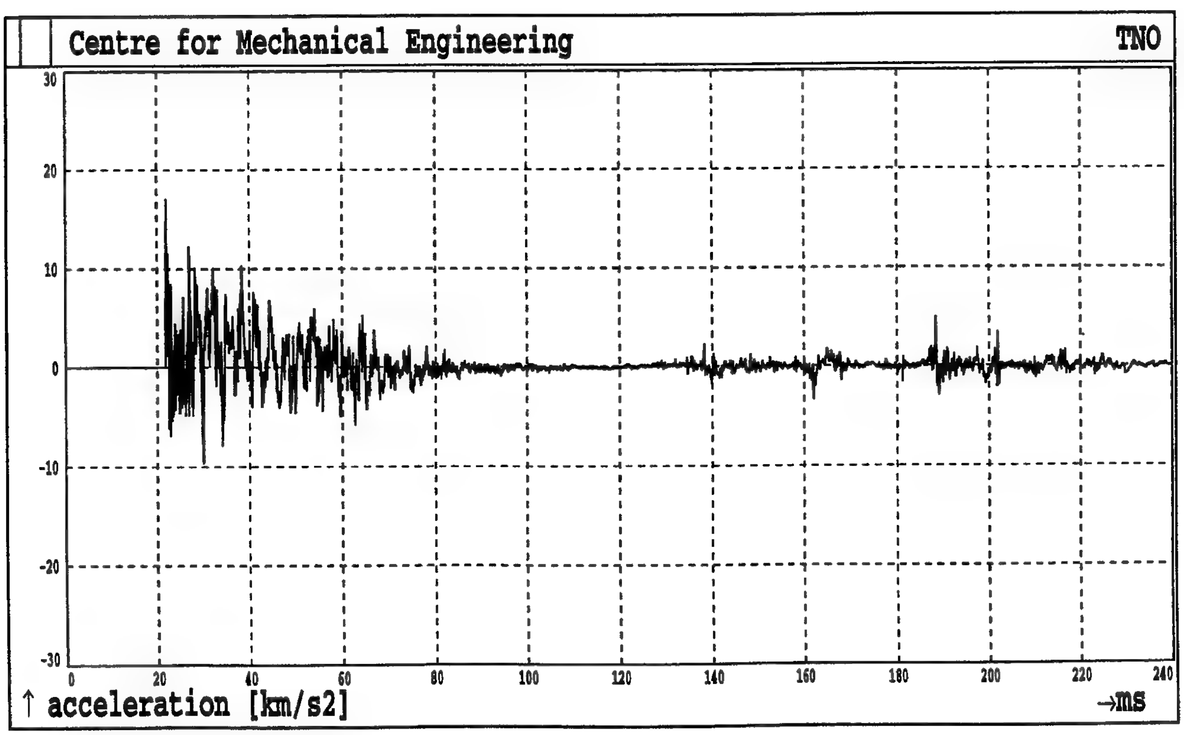


Fig.3B16. Shot 3 Sensor A8

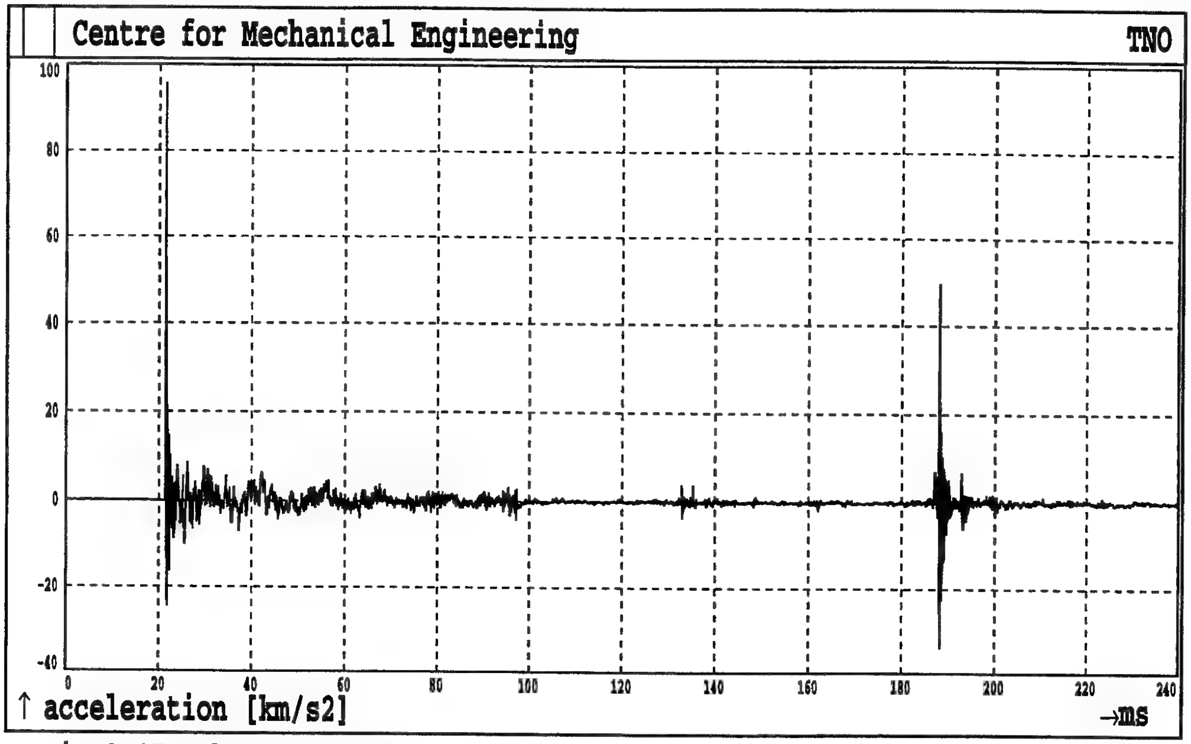


Fig.3B17. Shot 3 Sensor A9

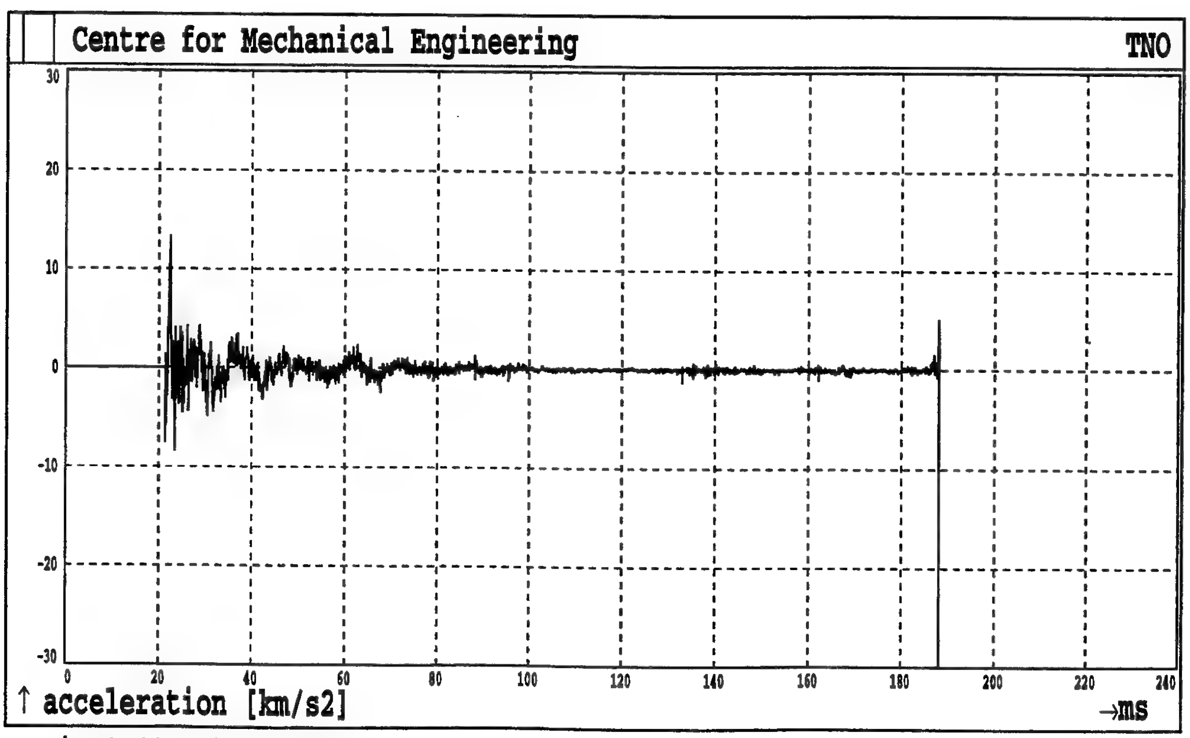


Fig.3B18. Shot 3 Sensor A10

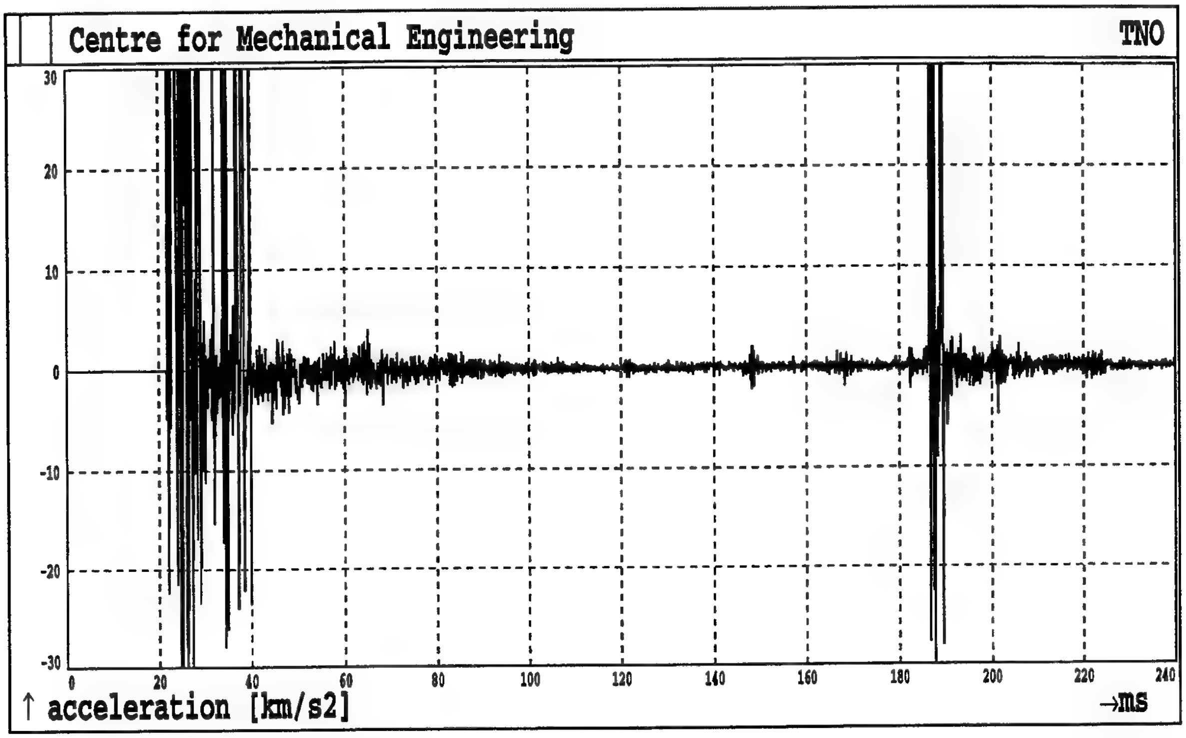


Fig.3B19. Shot 3 Sensor A11

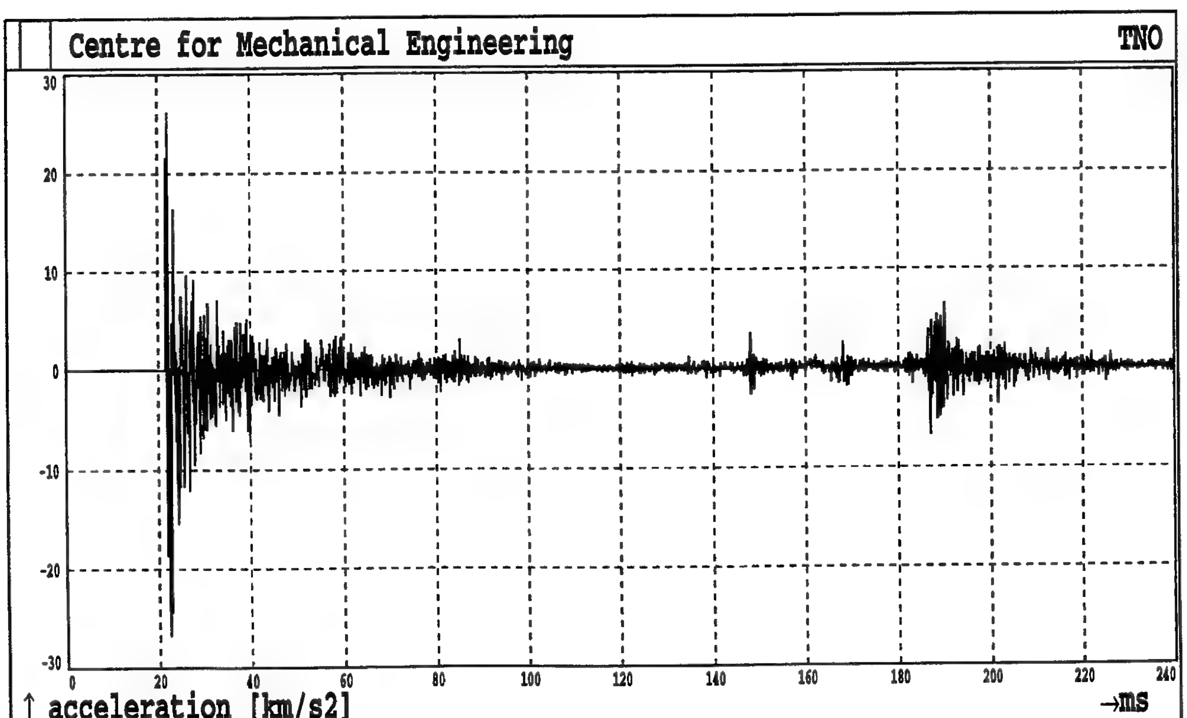


Fig.3B20. Shot 3 Sensor A12

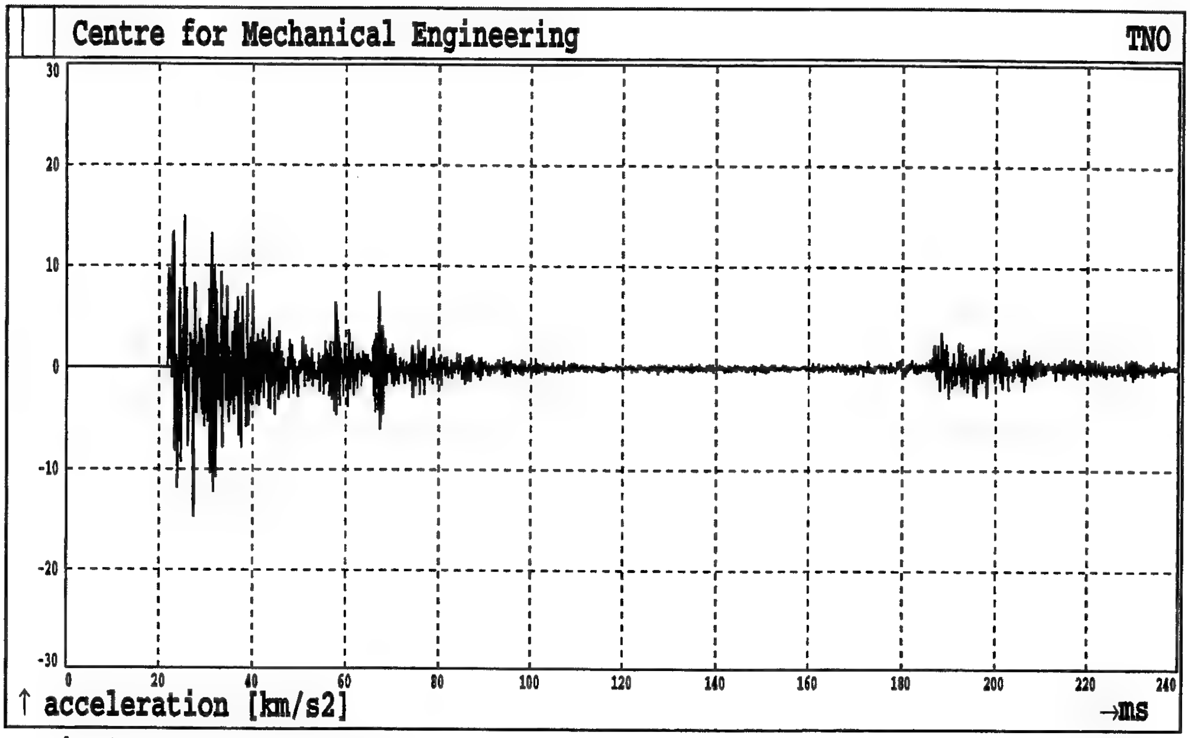


Fig.3B21. Shot 3 Sensor A13

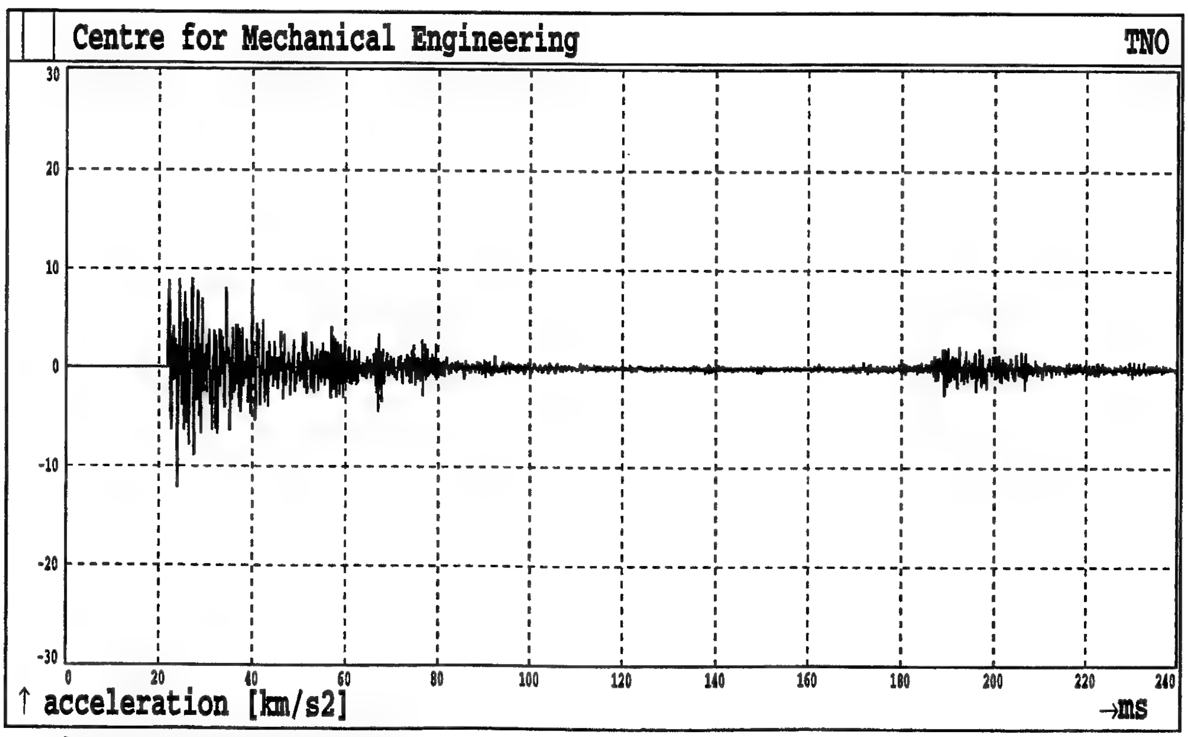


Fig.3B22. Shot 3 Sensor A14

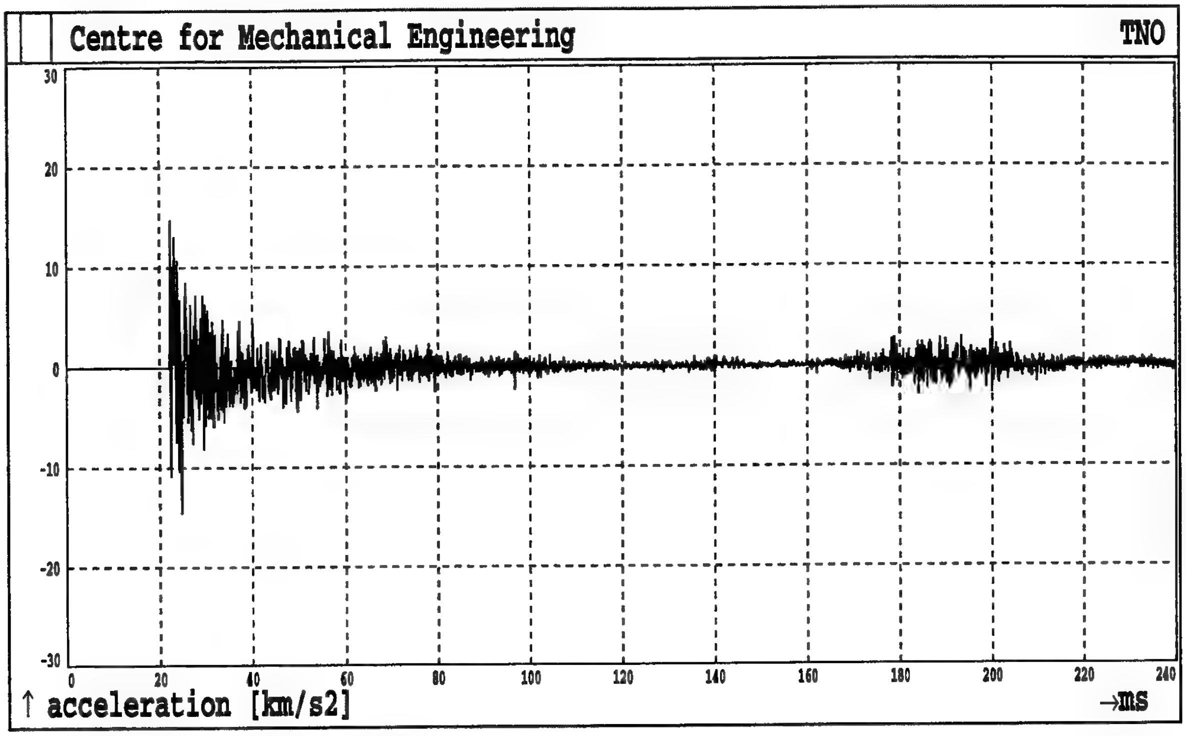


Fig.3B23. Shot 3 Sensor A15

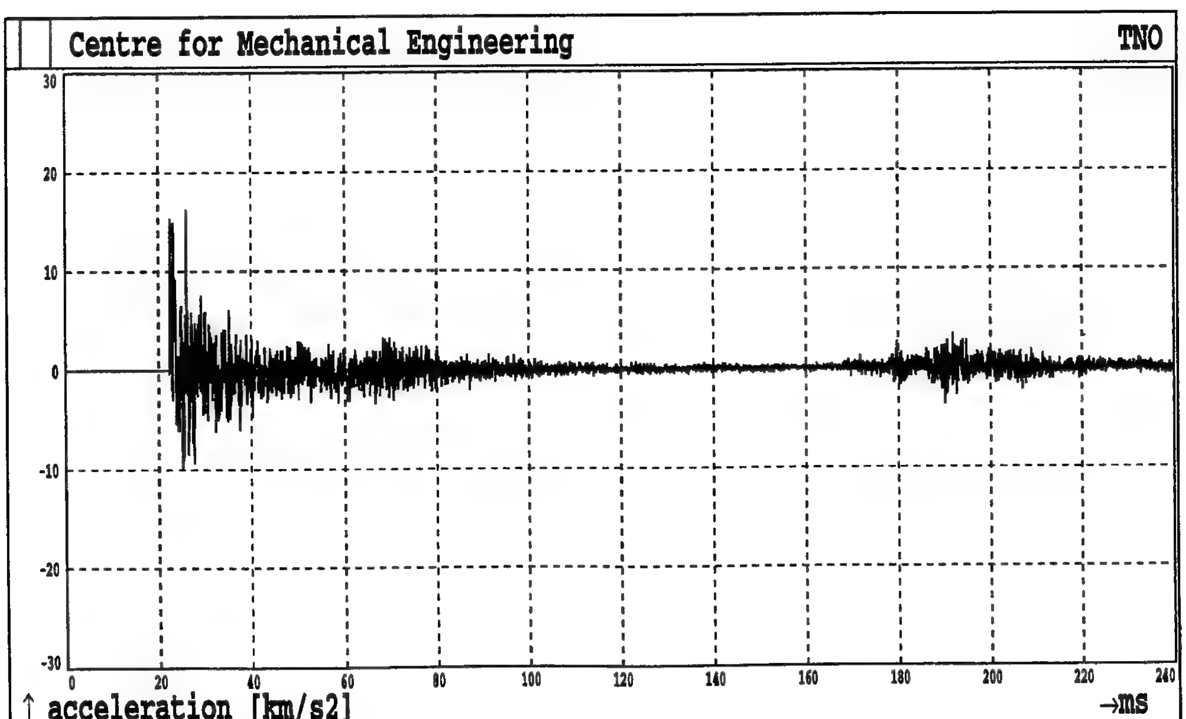


Fig.3B24. Shot 3 Sensor A16

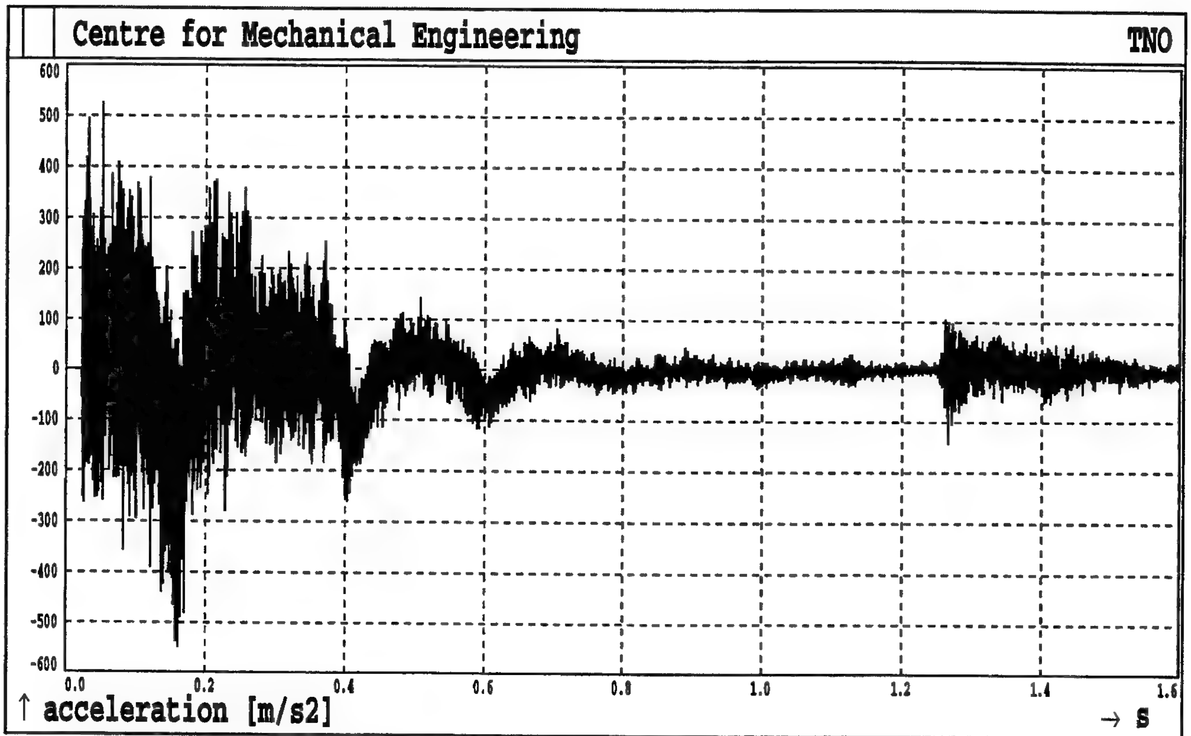


Fig.3B25. Shot 3 Sensor A17

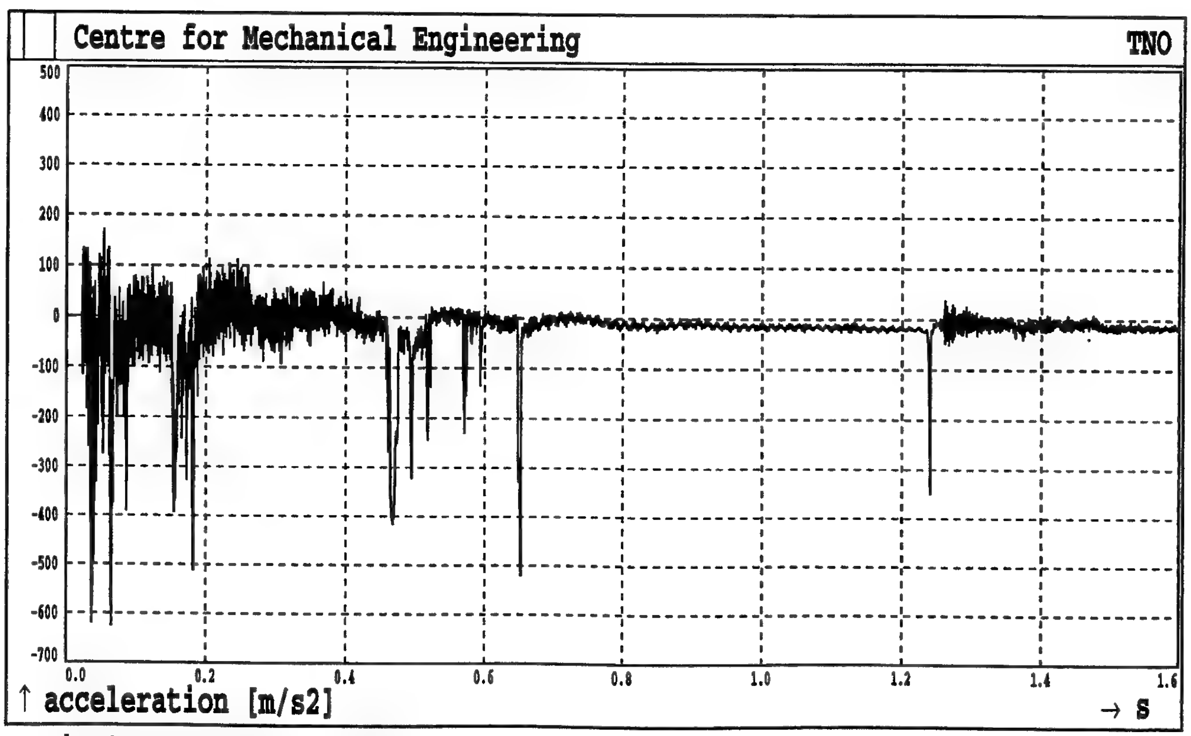


Fig.3B26. Shot 3 Sensor A18

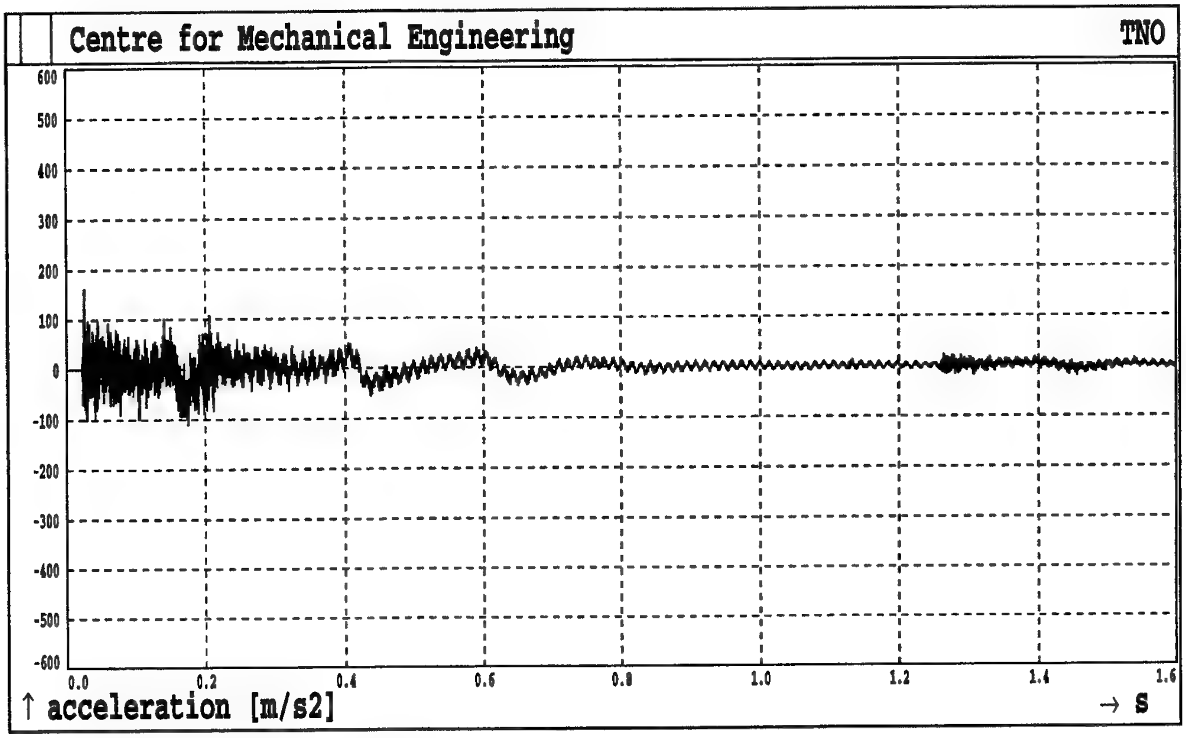


Fig.3B27. Shot 3 Sensor A19

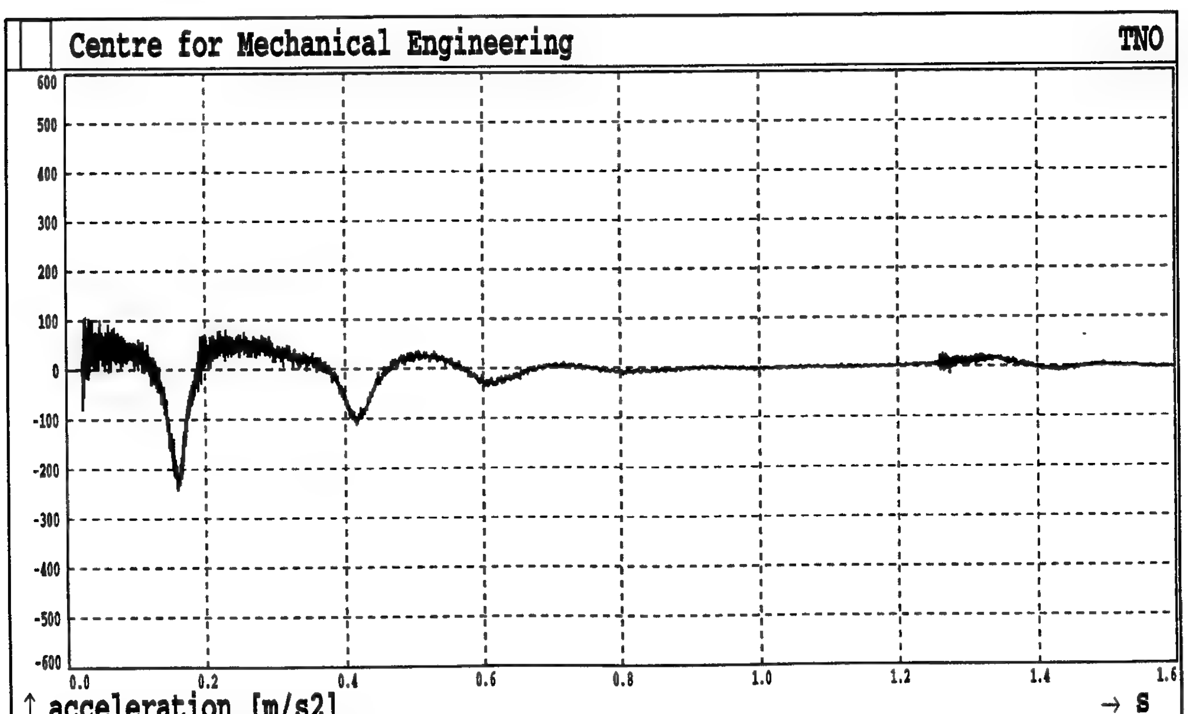


Fig.3B28. Shot 3 Sensor A20

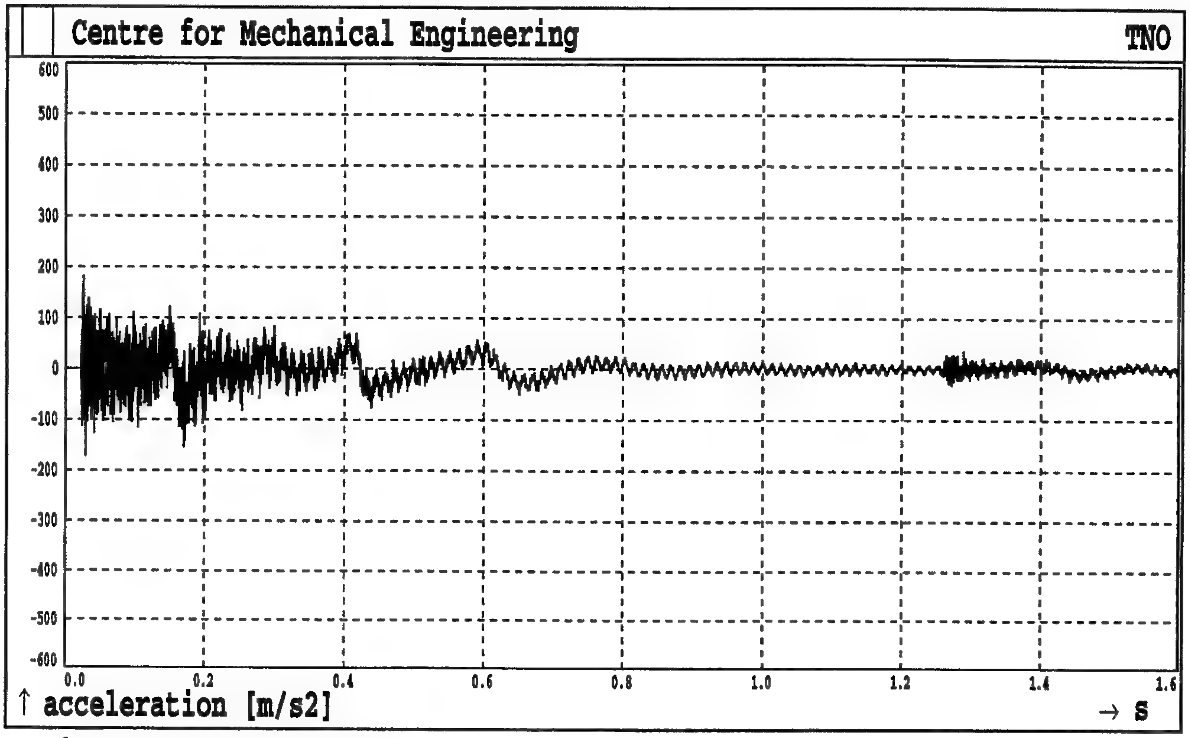


Fig.3B29. Shot 3 Sensor A21

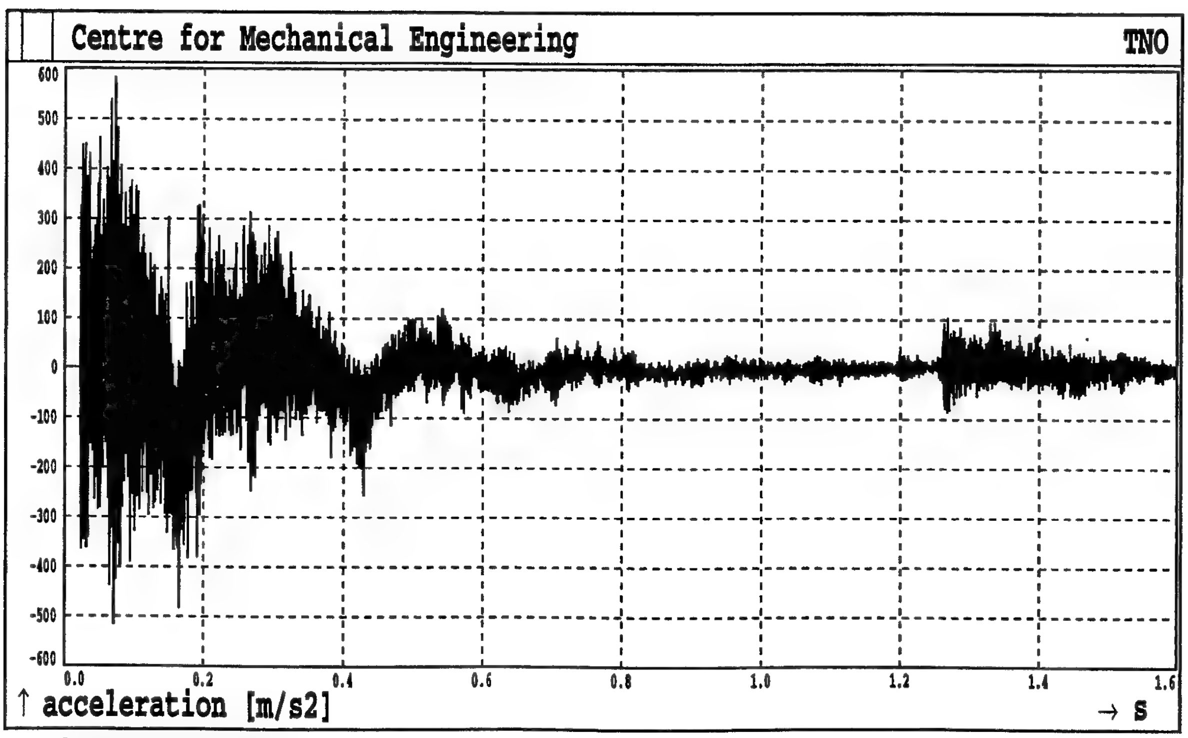


Fig.3B30. Shot 3 Sensor A22

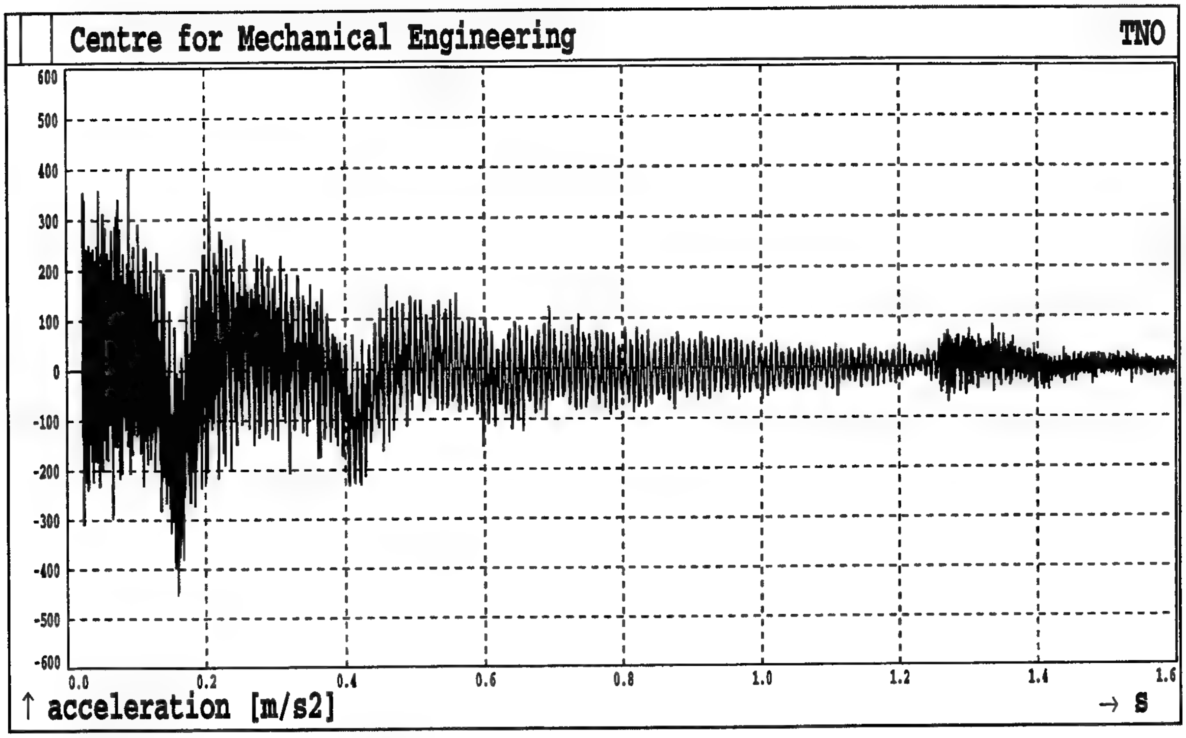


Fig.3B31. Shot 3 Sensor A23

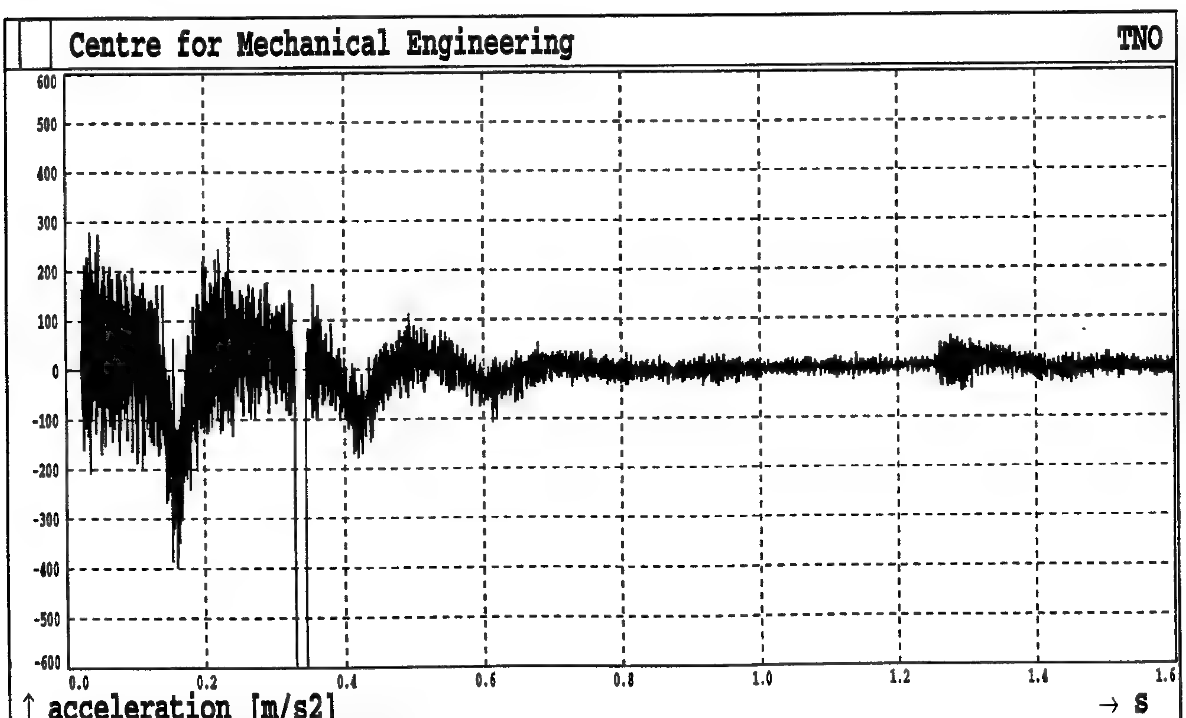


Fig.3B32. Shot 3 Sensor A24

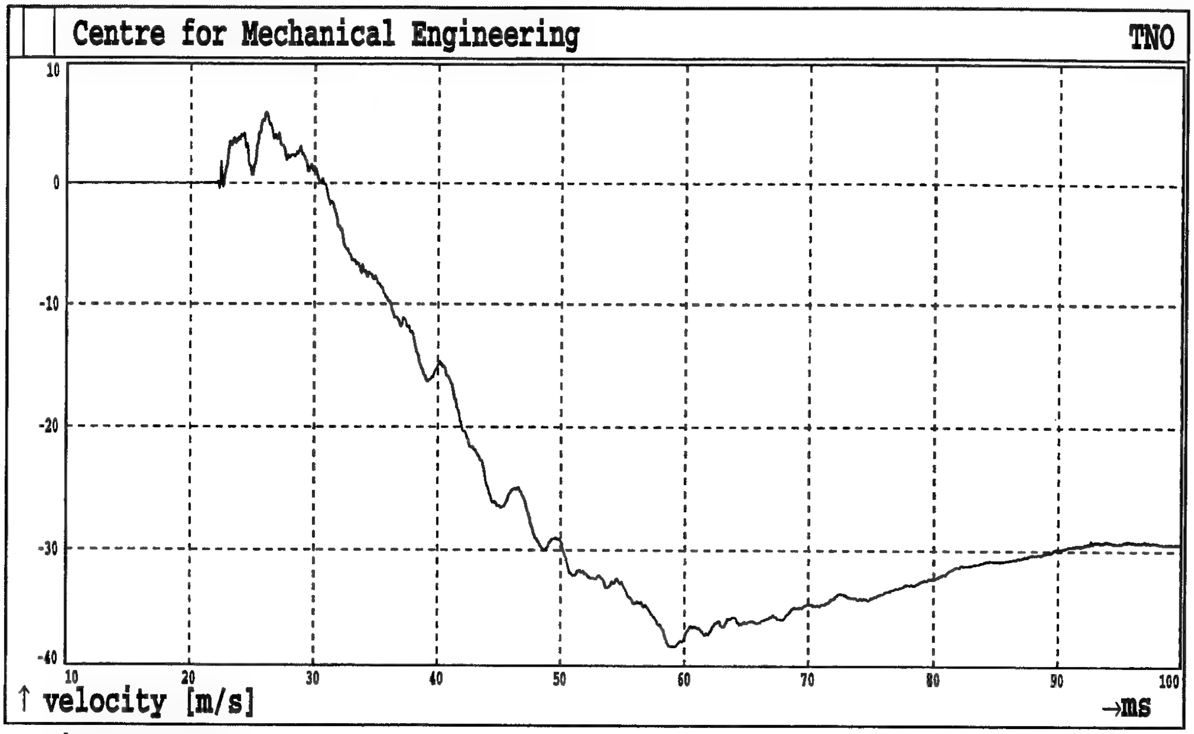


Fig.3B33. Shot 3 Sensor A1

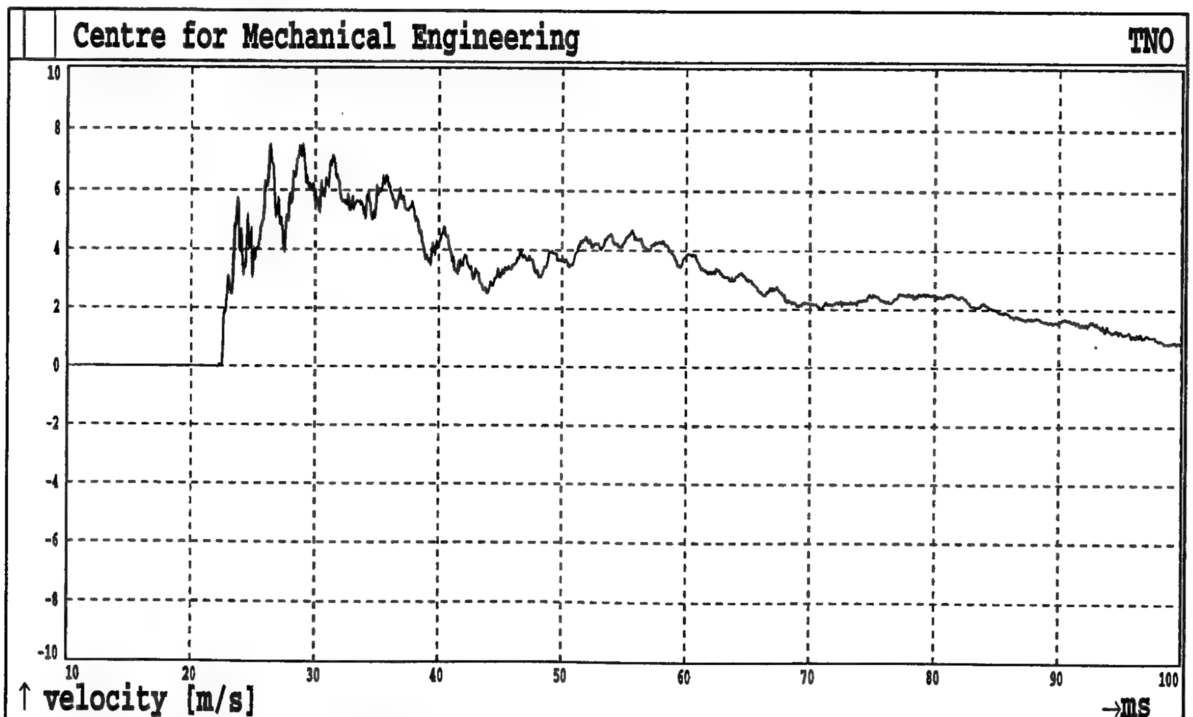


Fig.3B34. Shot 3 Sensor A2

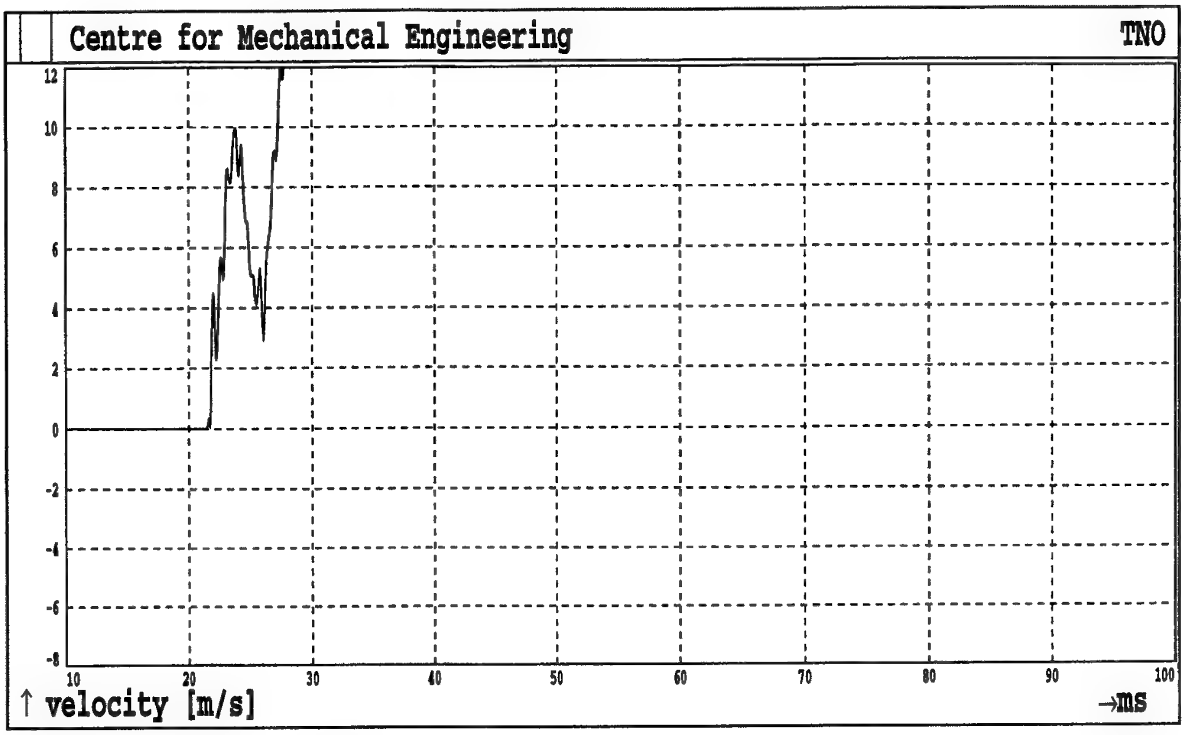


Fig.3B35. Shot 3 Sensor A3

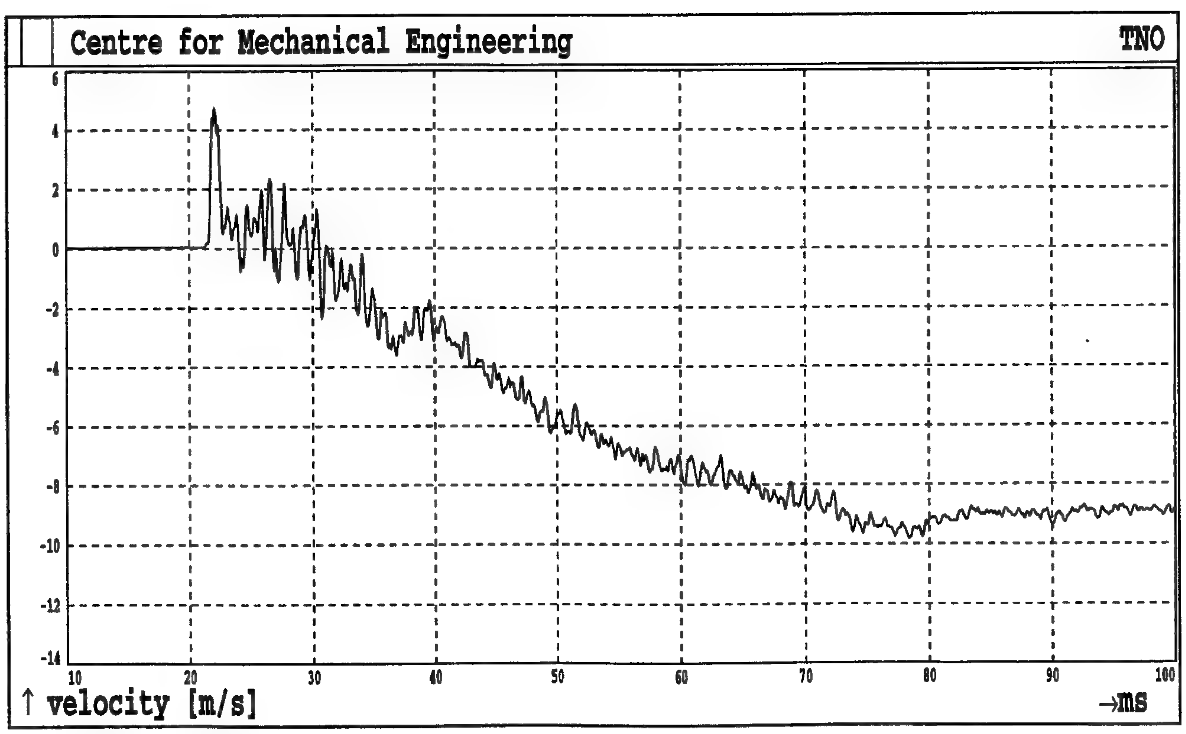


Fig.3B36. Shot 3 Sensor A4

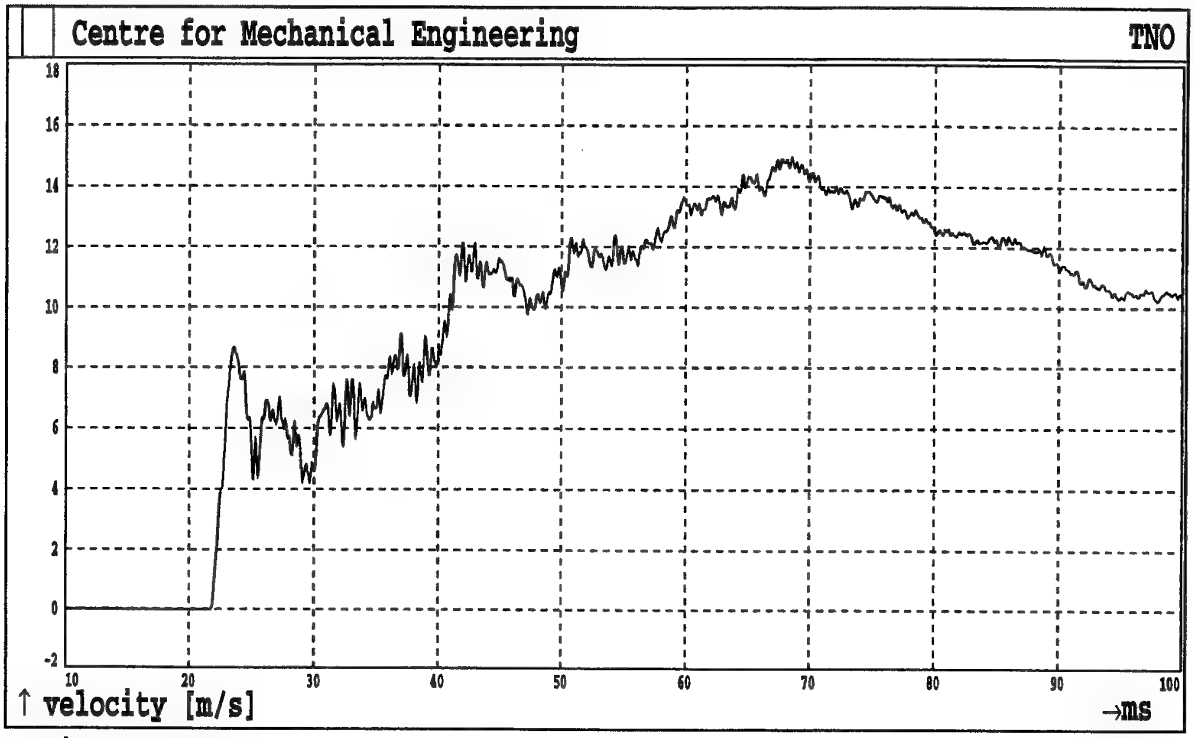


Fig.3B37. Shot 3 Sensor A5

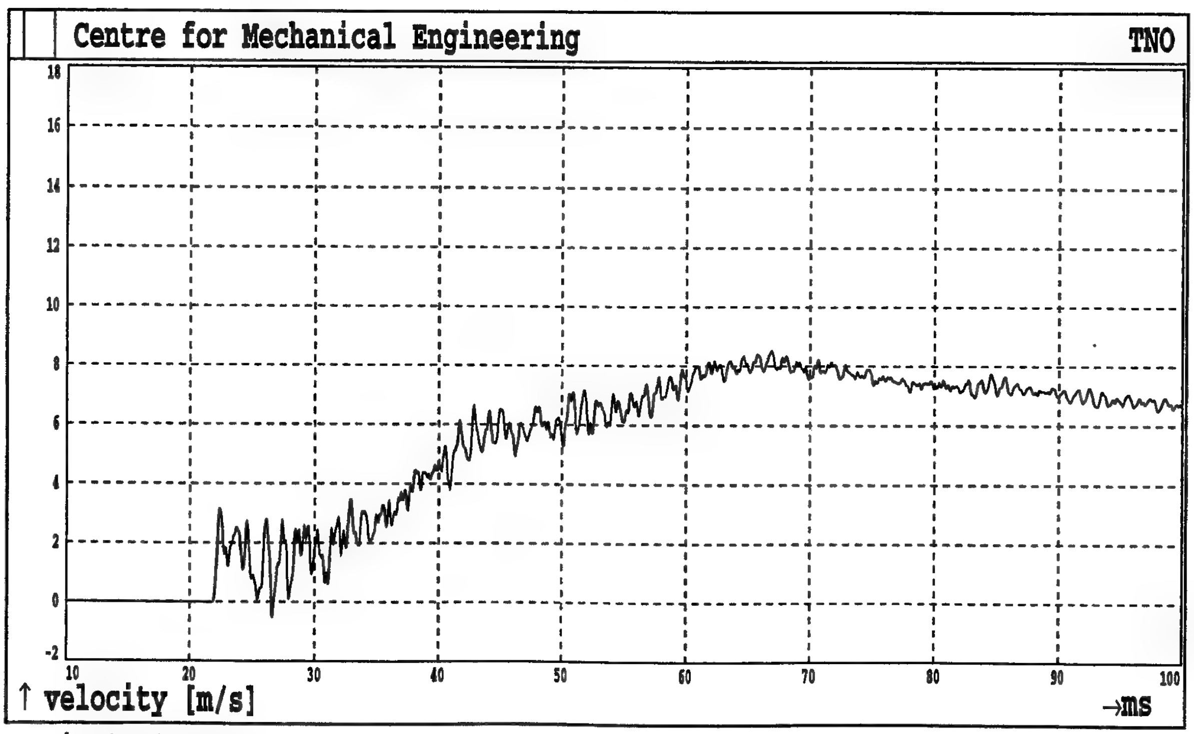


Fig.3B38. Shot 3 Sensor A6

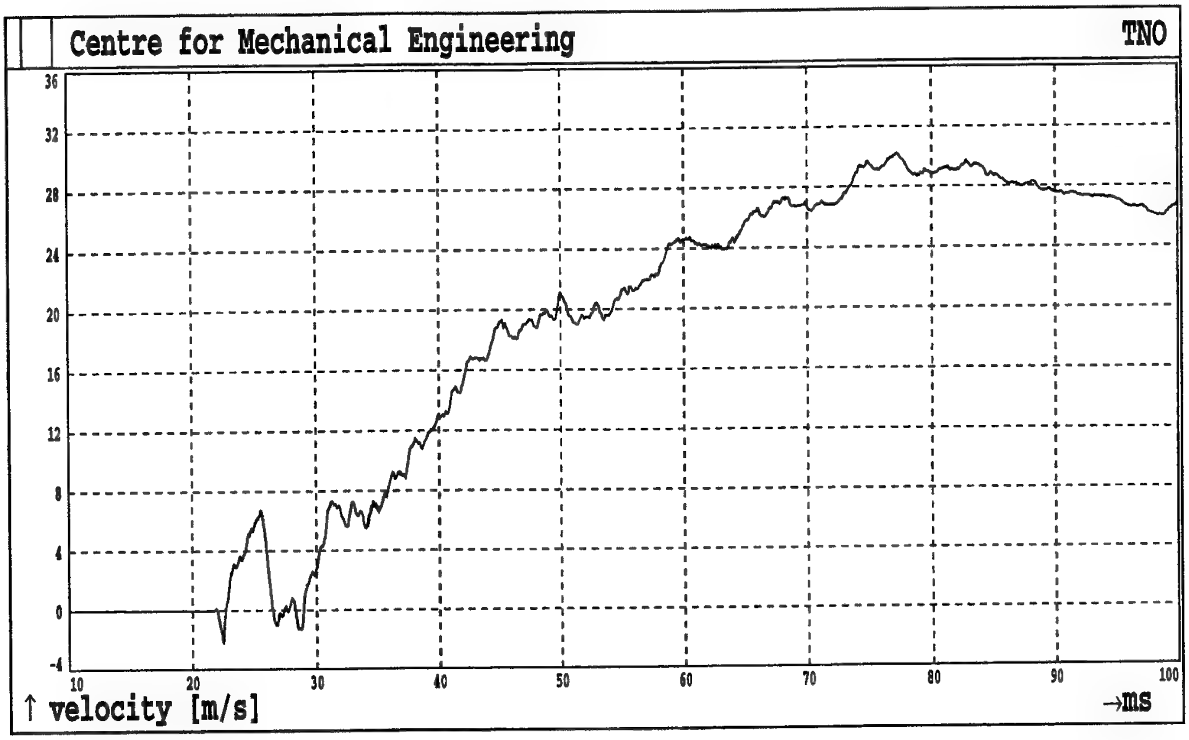


Fig.3B39. Shot 3 Sensor A7

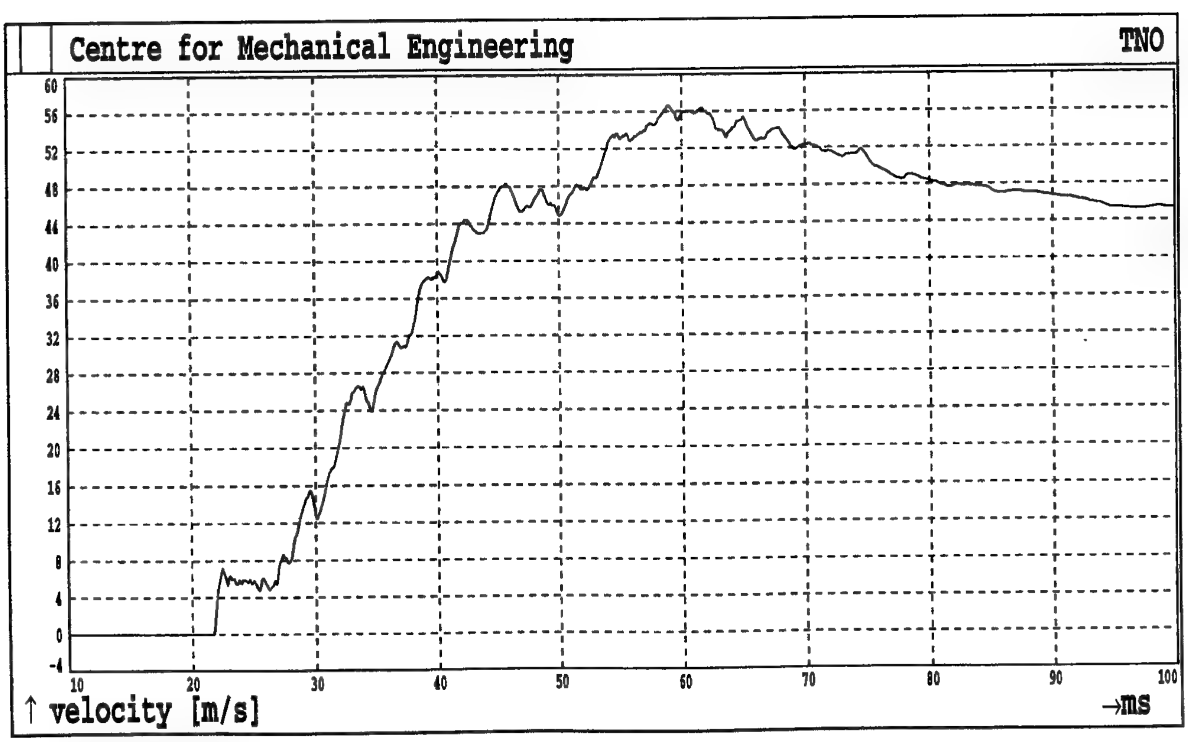


Fig.3B40. Shot 3 Sensor A8

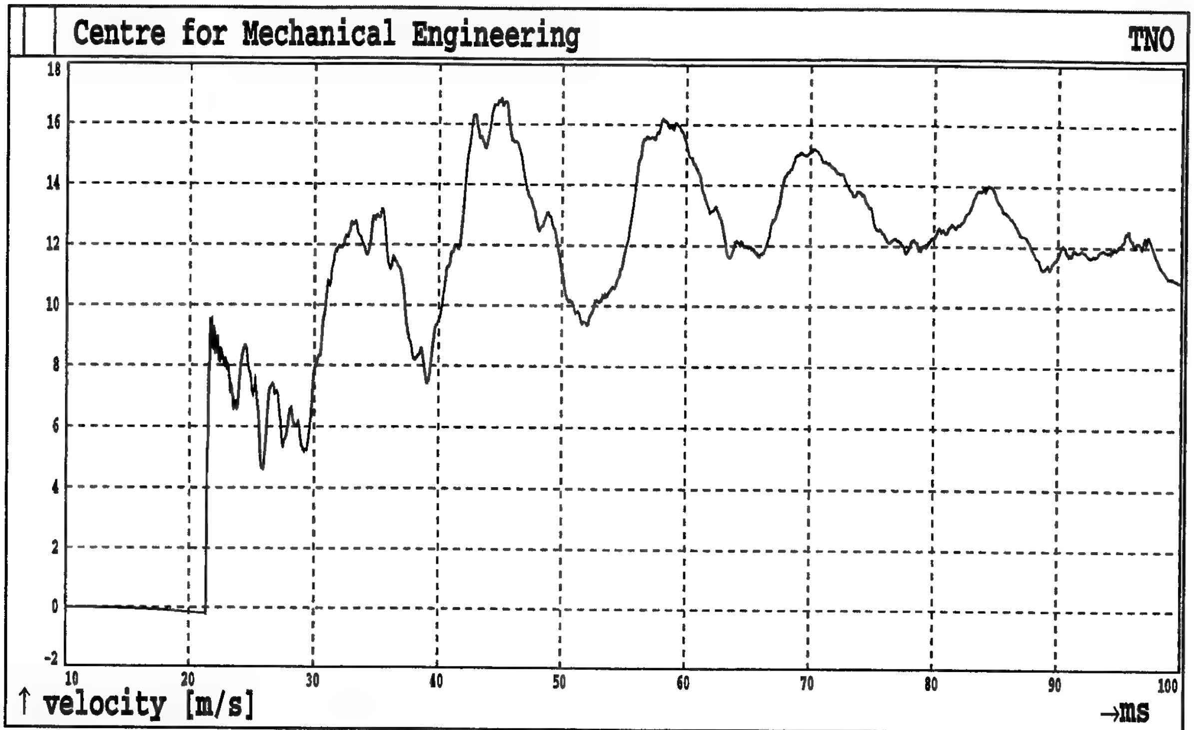


Fig.3B41. Shot 3 Sensor A9

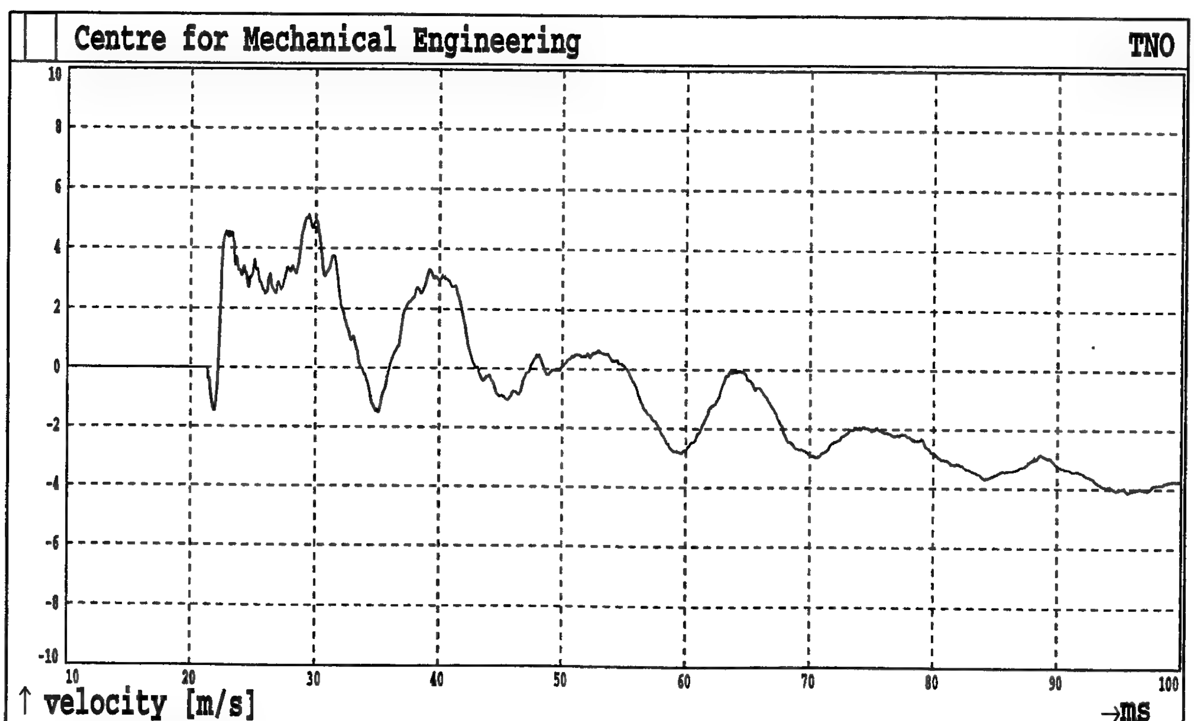


Fig.3B42. Shot 3 Sensor A10

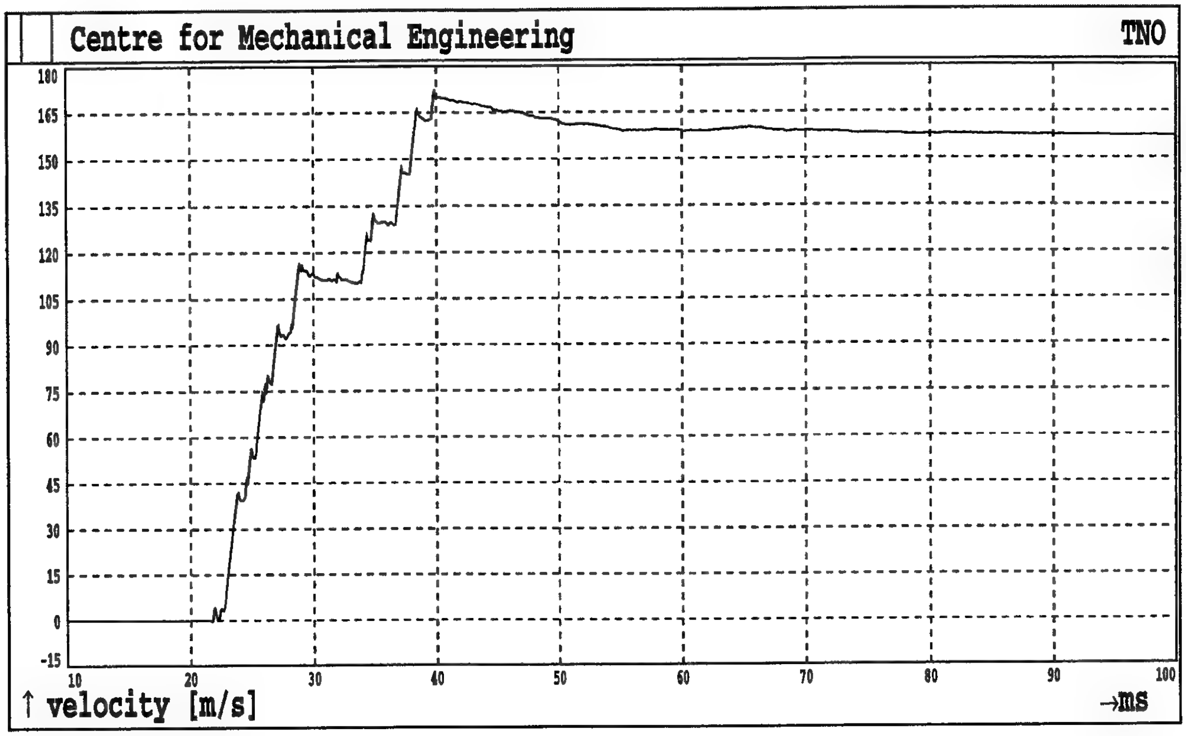


Fig.3B43. Shot 3 Sensor A11

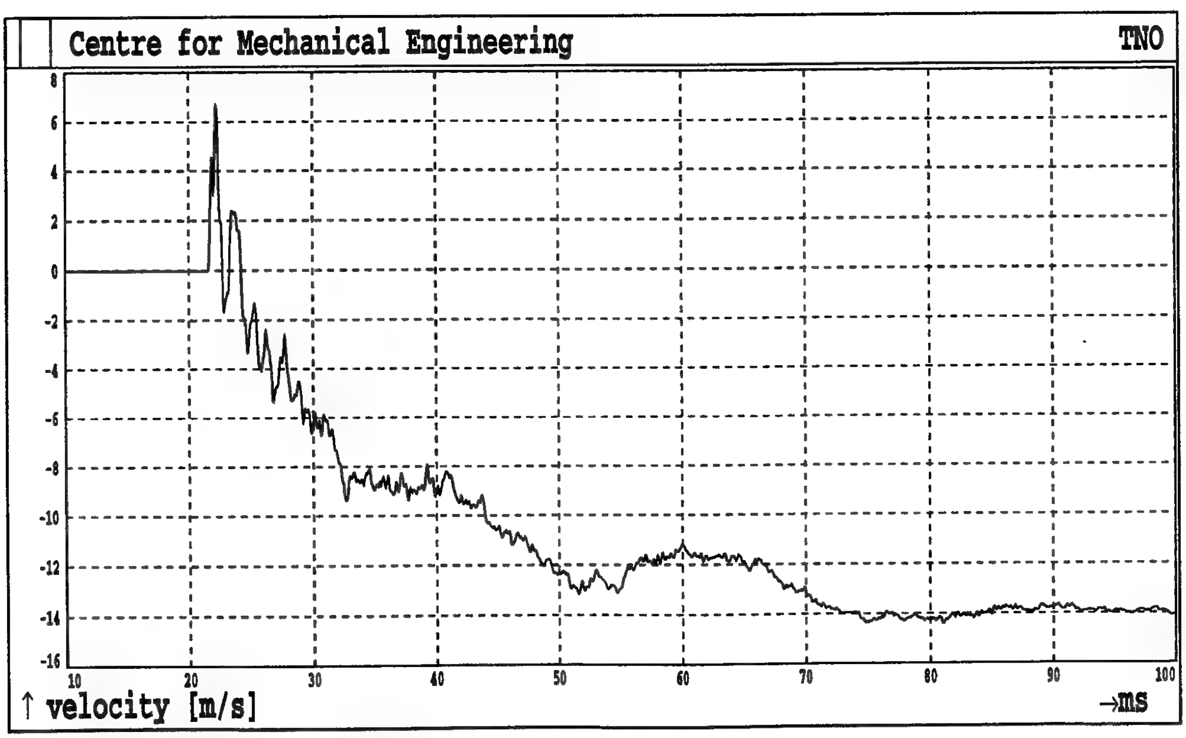


Fig.3B44. Shot 3 Sensor A12

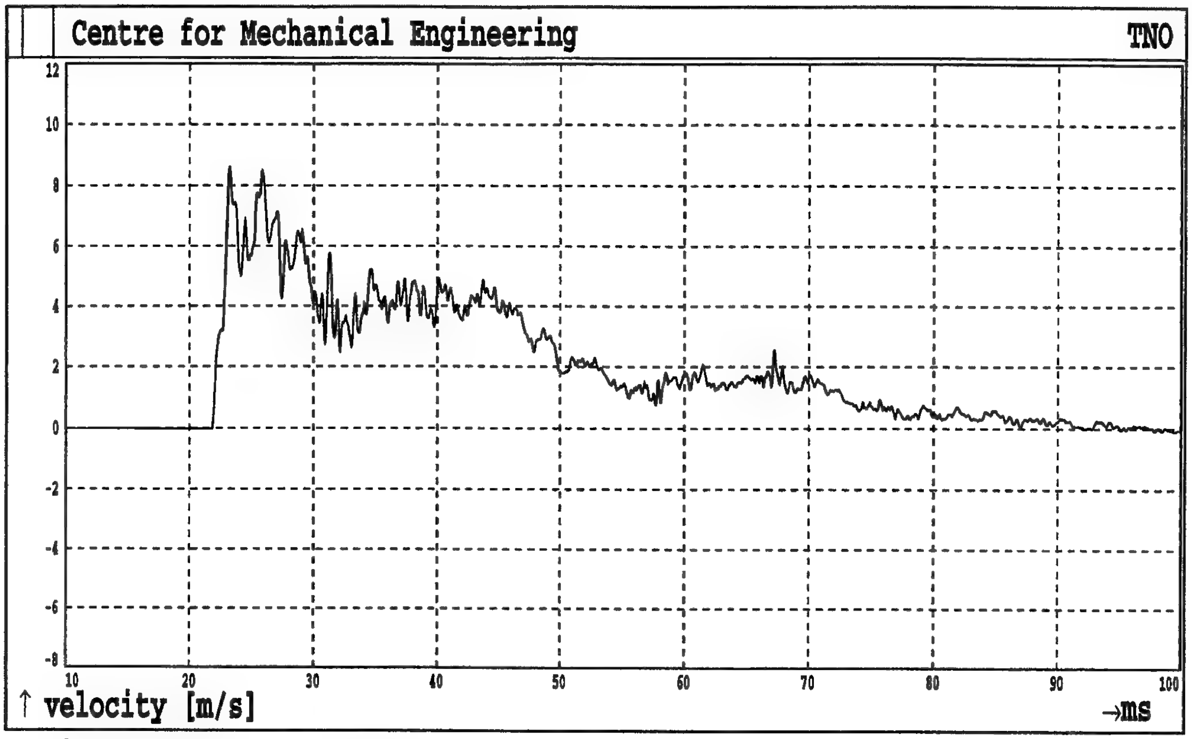


Fig.3B45. Shot 3 Sensor A13

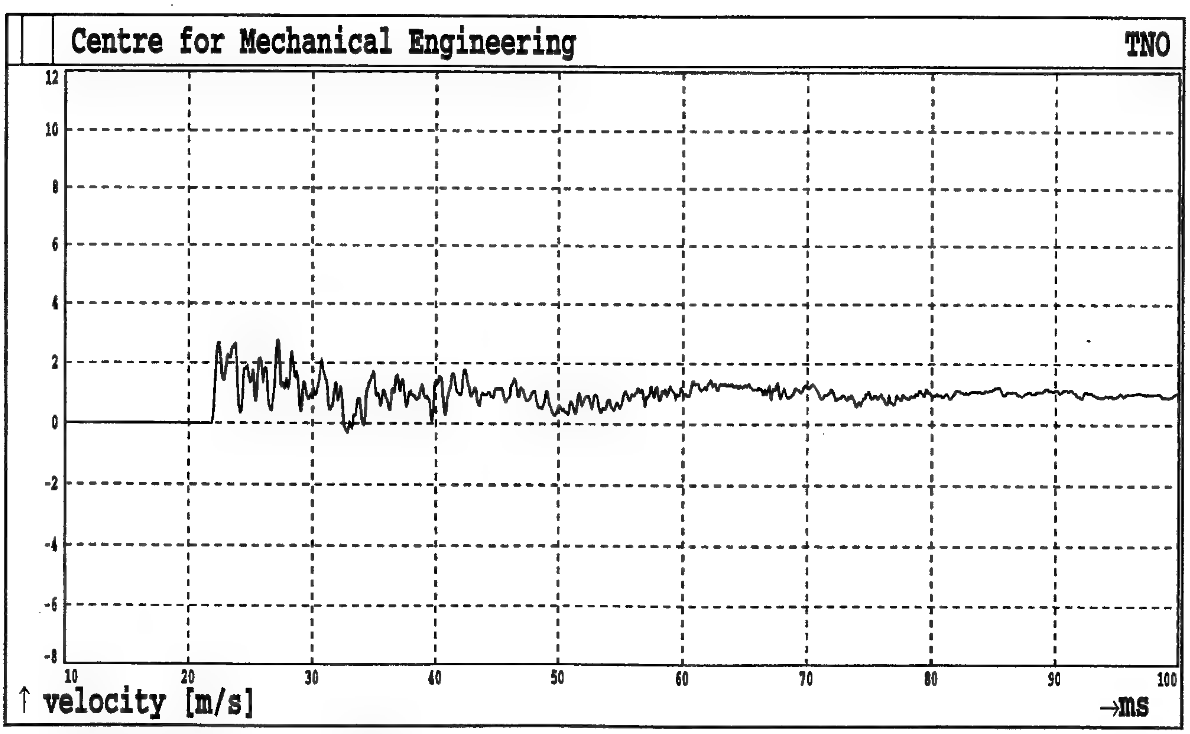


Fig.3B46. Shot 3 Sensor A14

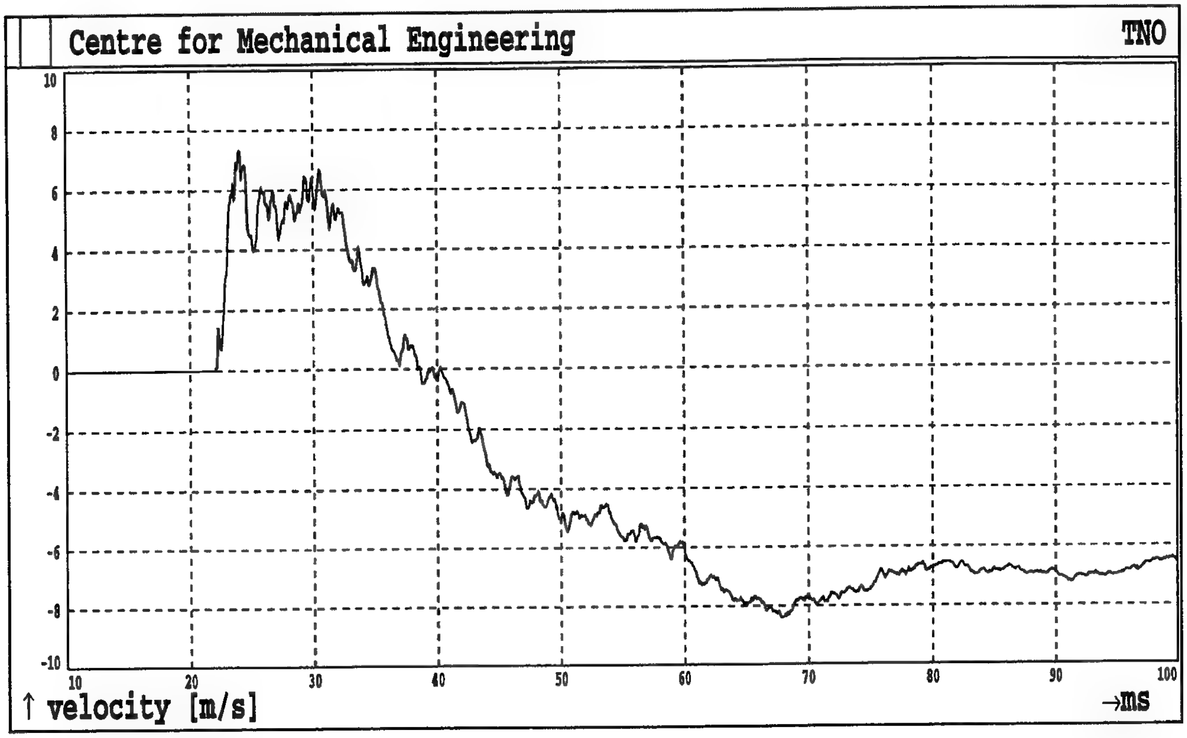


Fig.3B47. Shot 3 Sensor A15

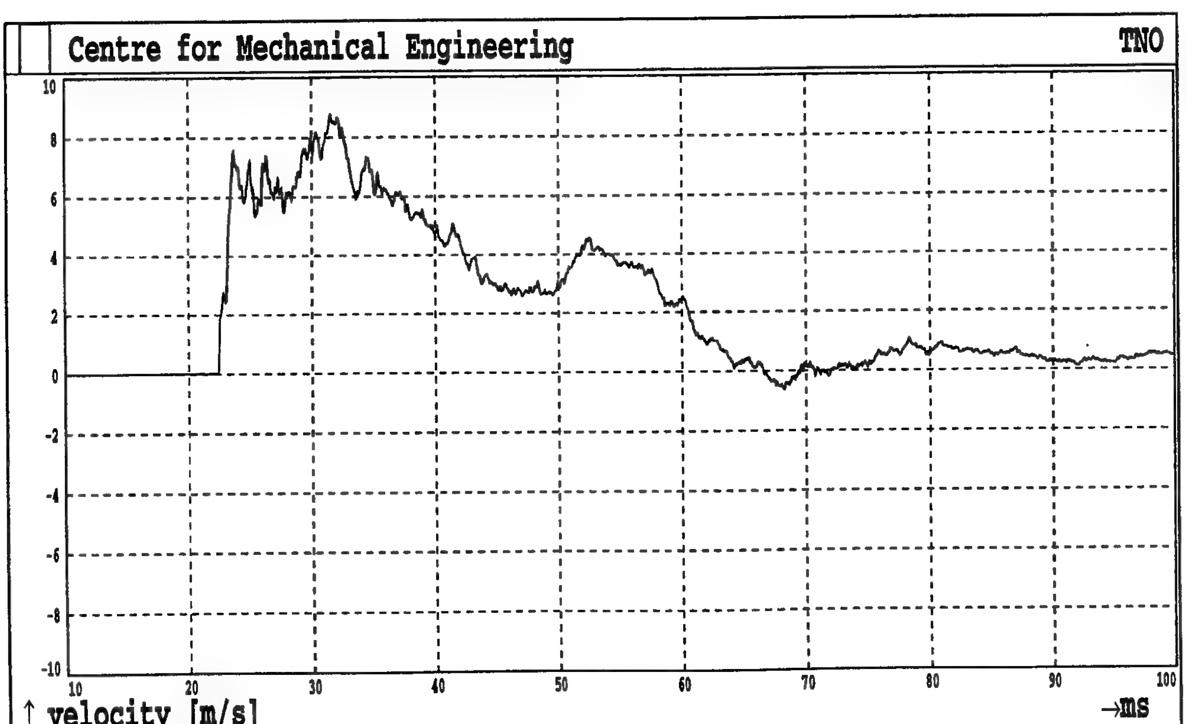


Fig.3B48. Shot 3 Sensor A16

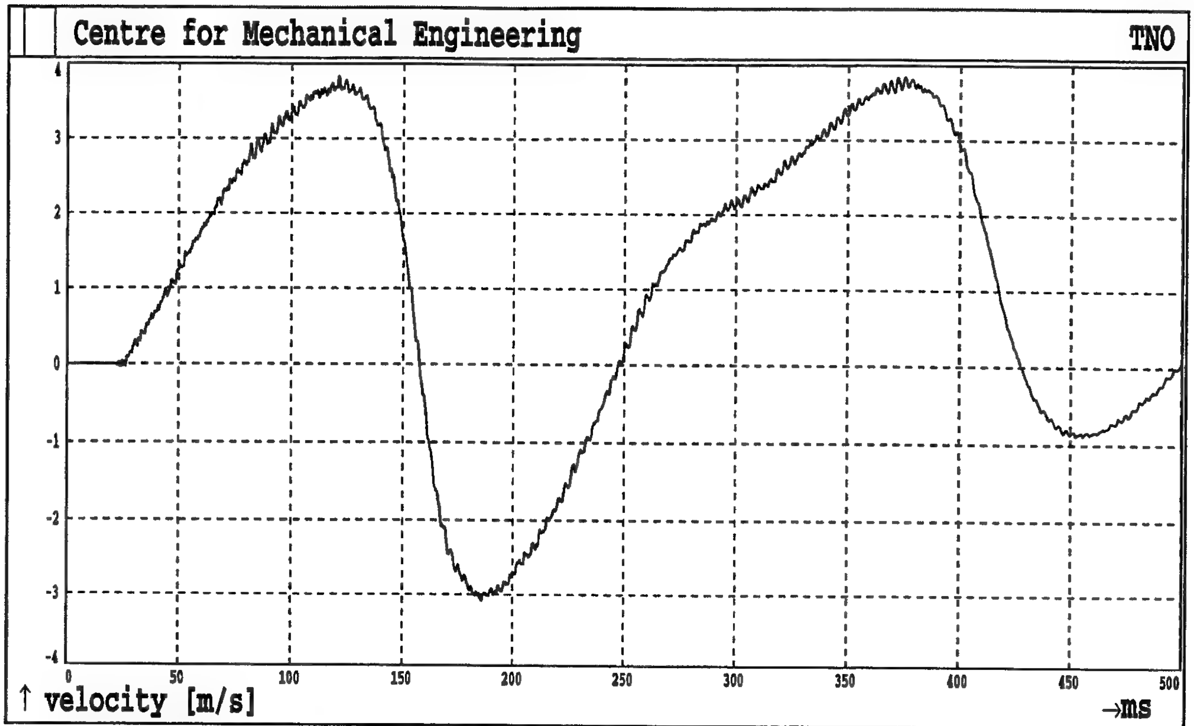


Fig.3B49. Shot 3 Sensor A17

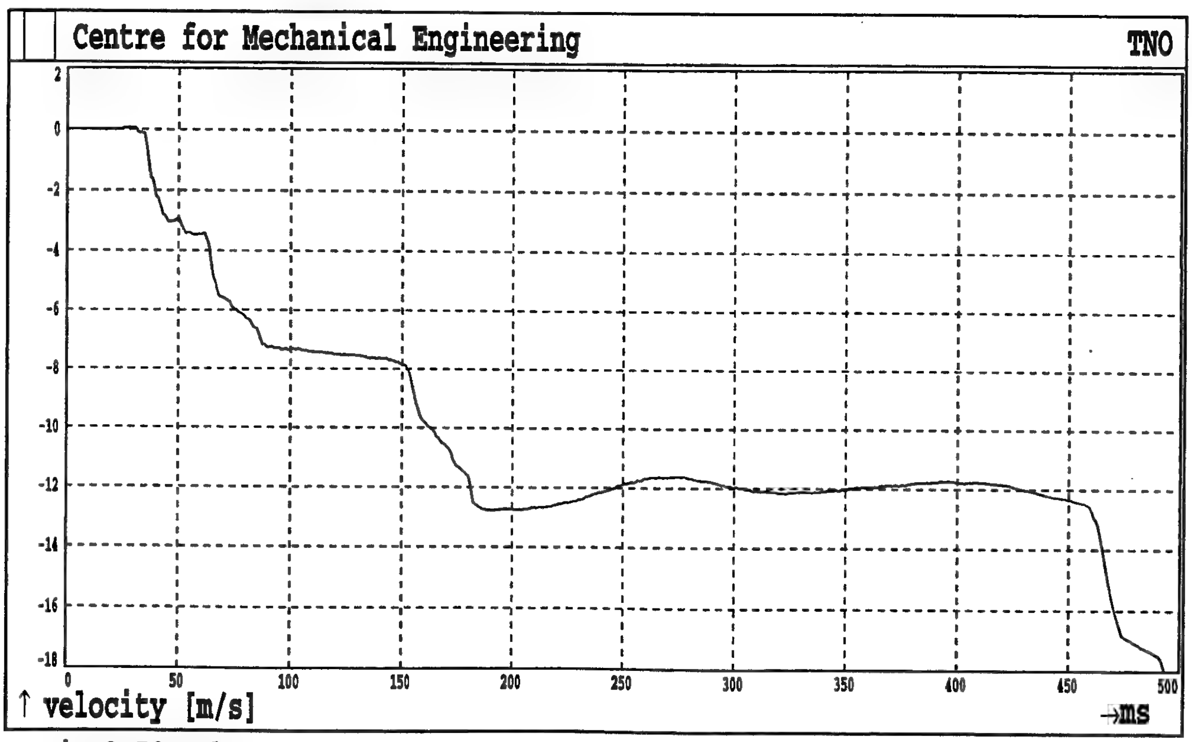


Fig.3B50. Shot 3 Sensor A18

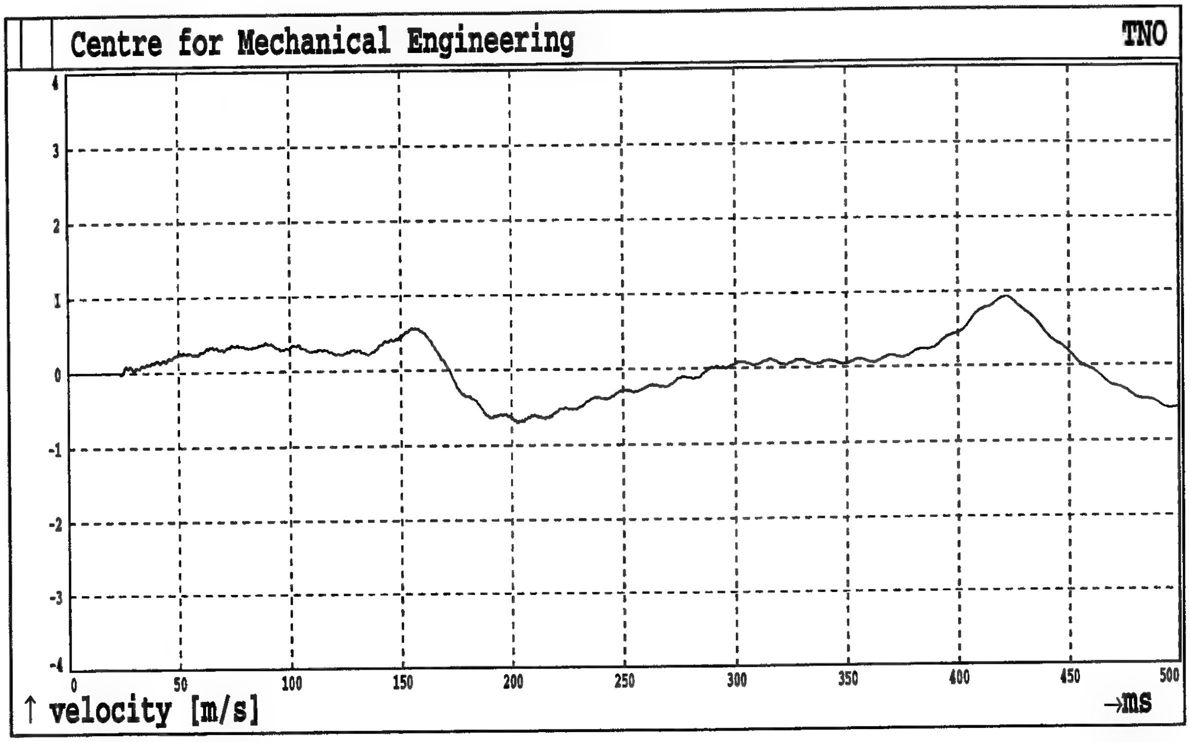


Fig.3B51. Shot 3 Sensor A19

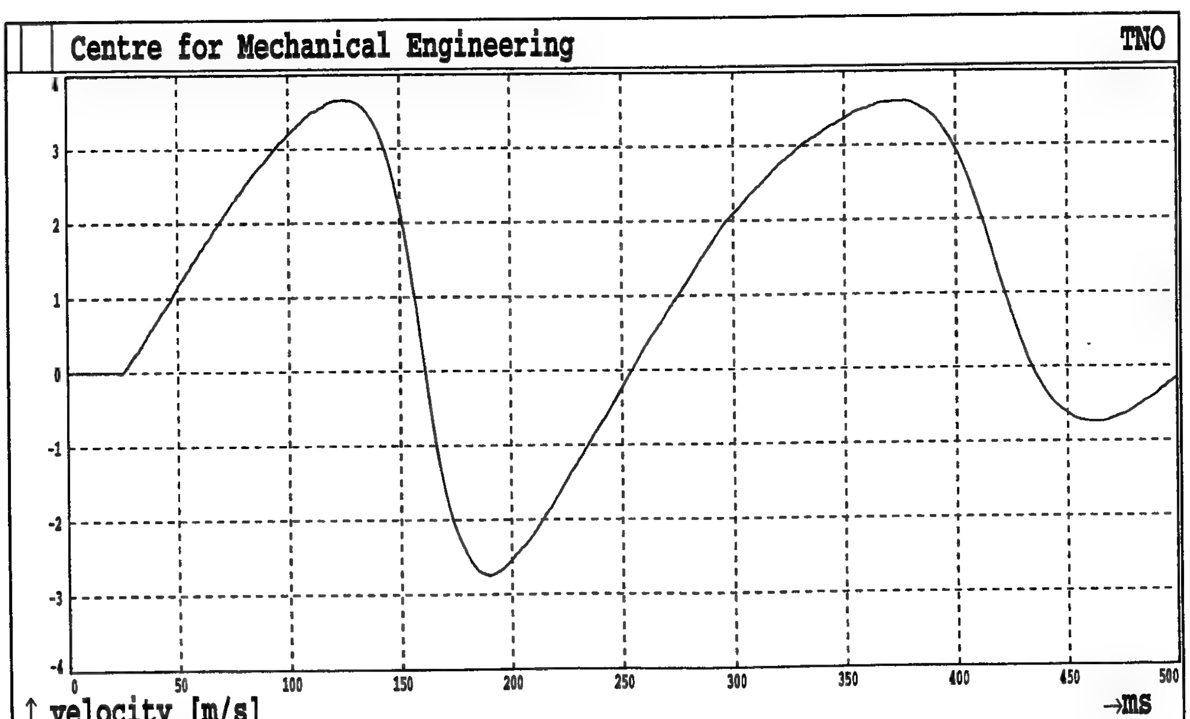


Fig.3B52. Shot 3 Sensor A20

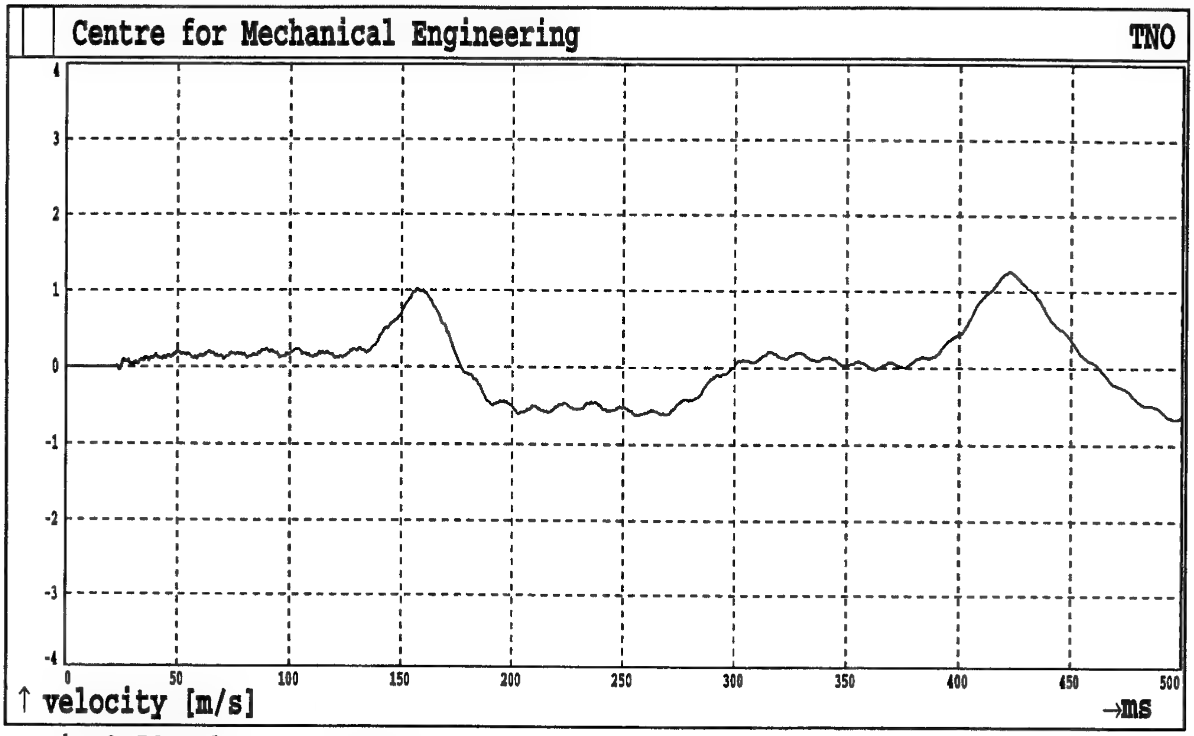


Fig.3B53. Shot 3 Sensor A21

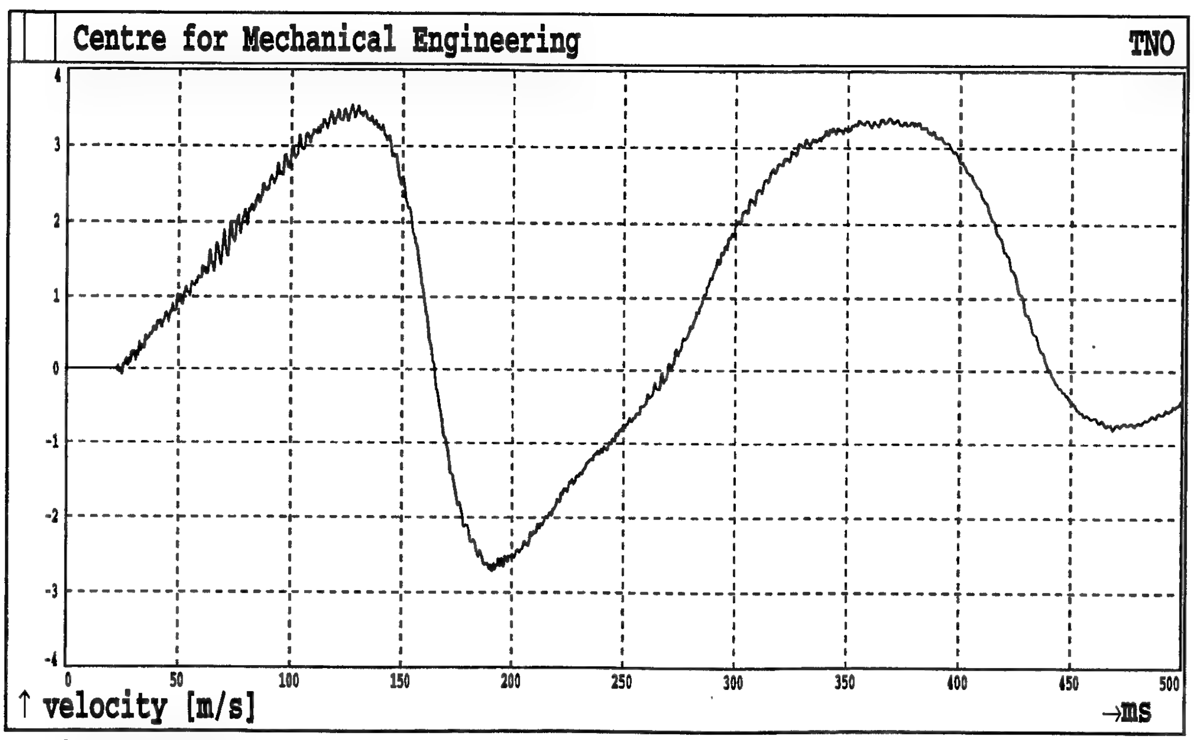


Fig.3B54. Shot 3 Sensor A22

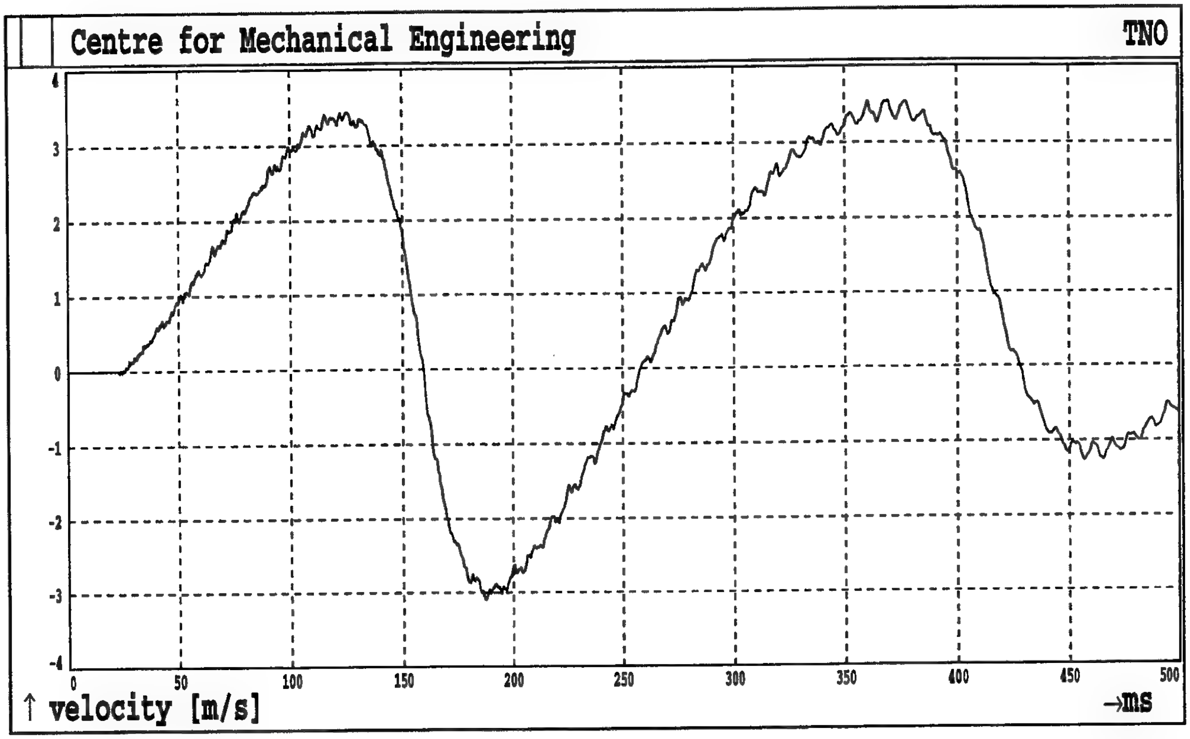
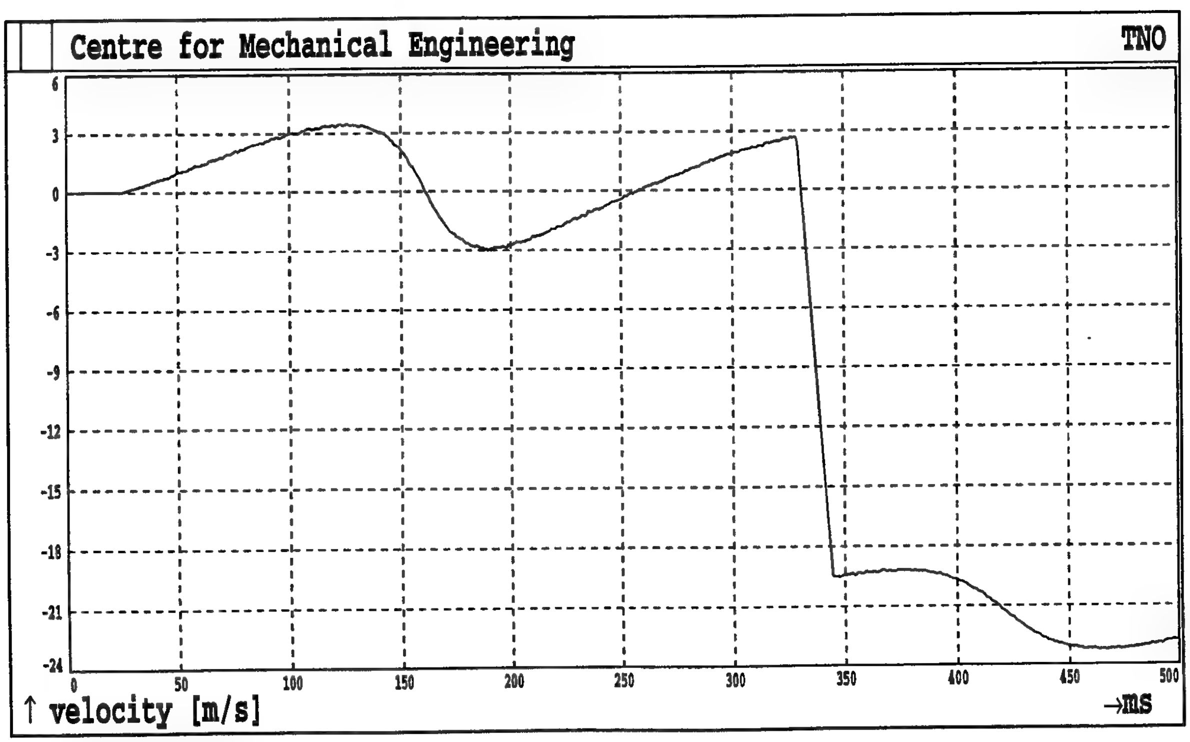


Fig.3B55. Shot 3 Sensor A23



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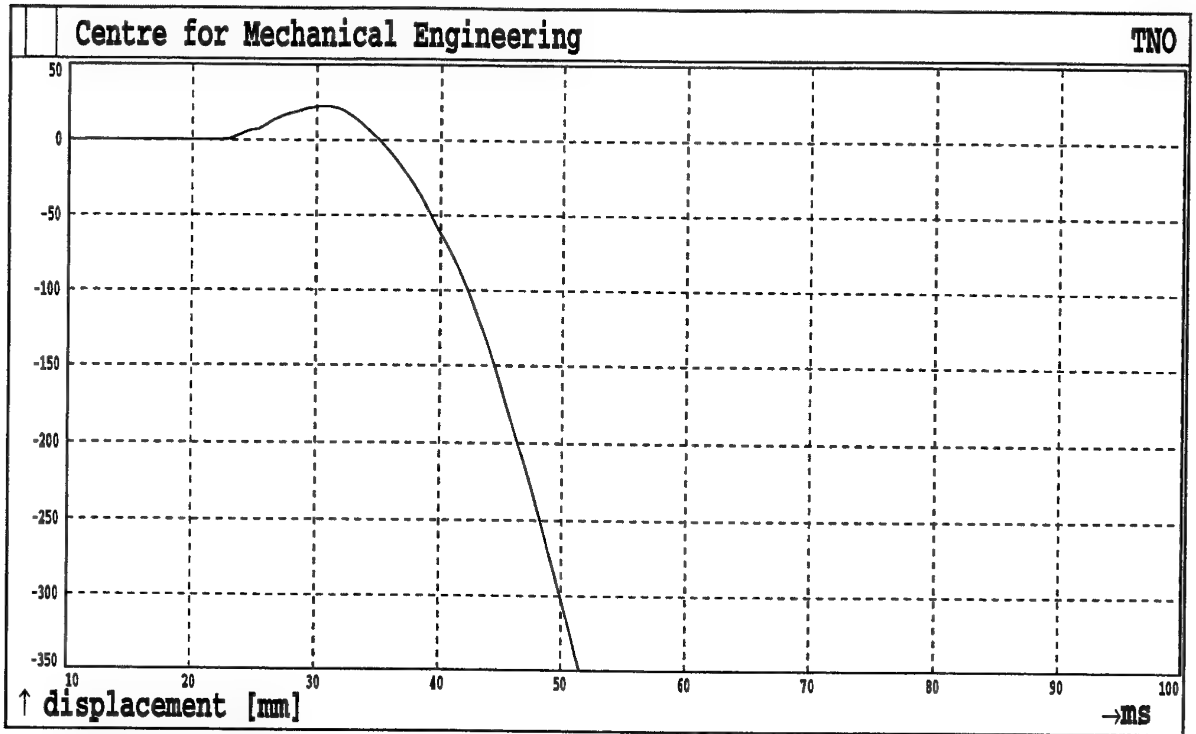

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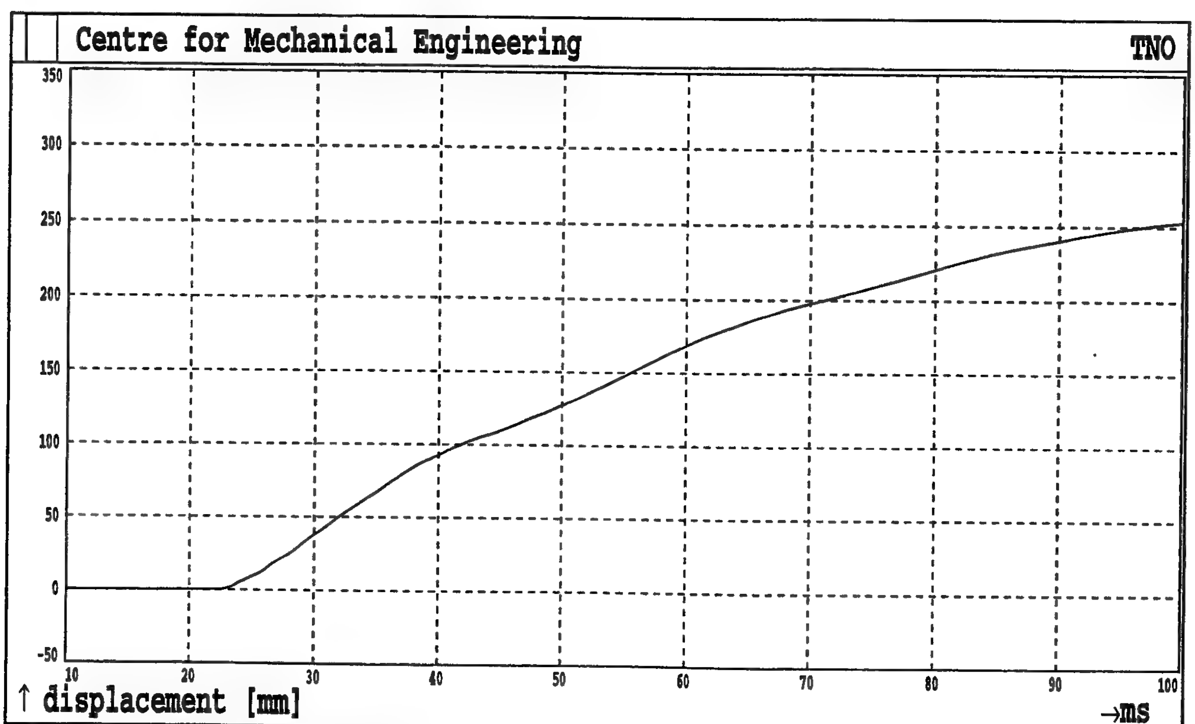

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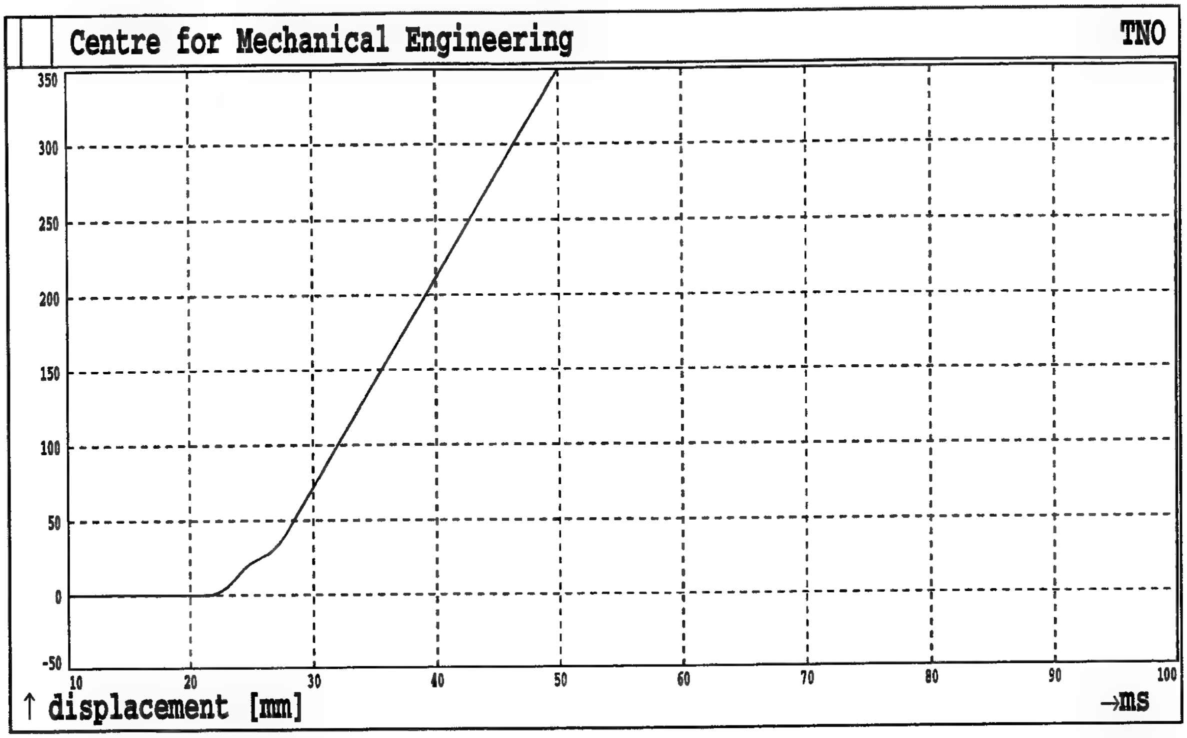

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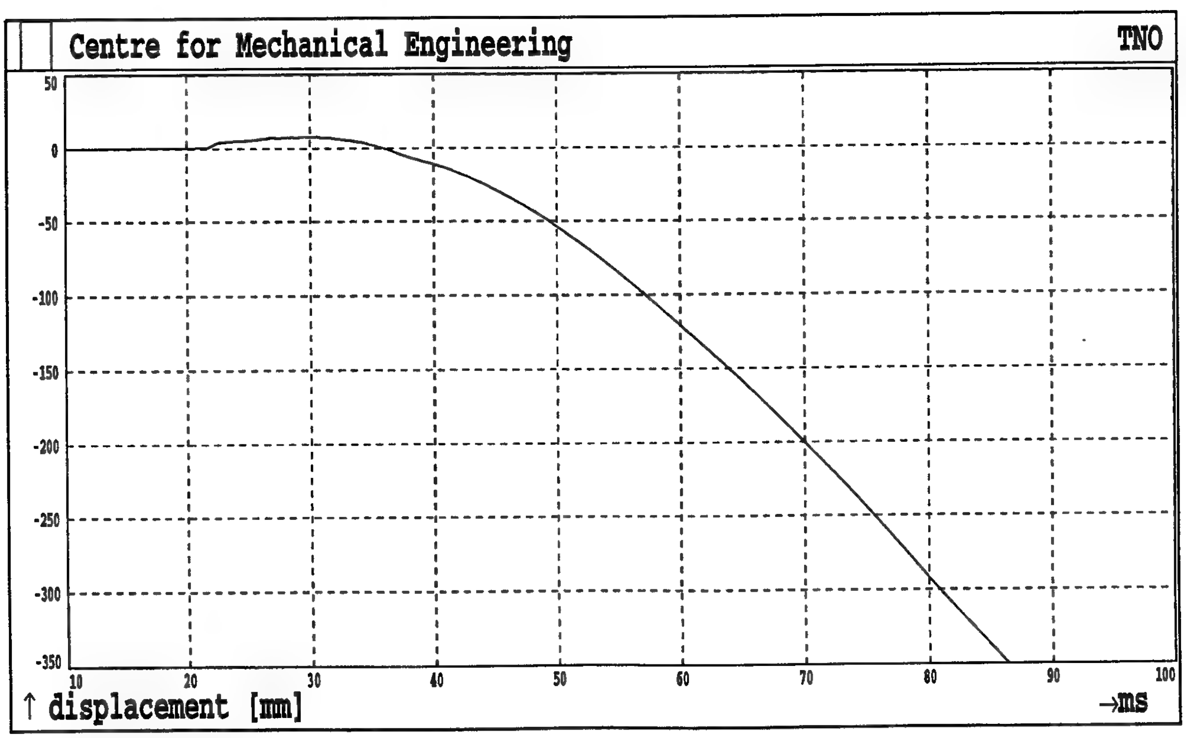

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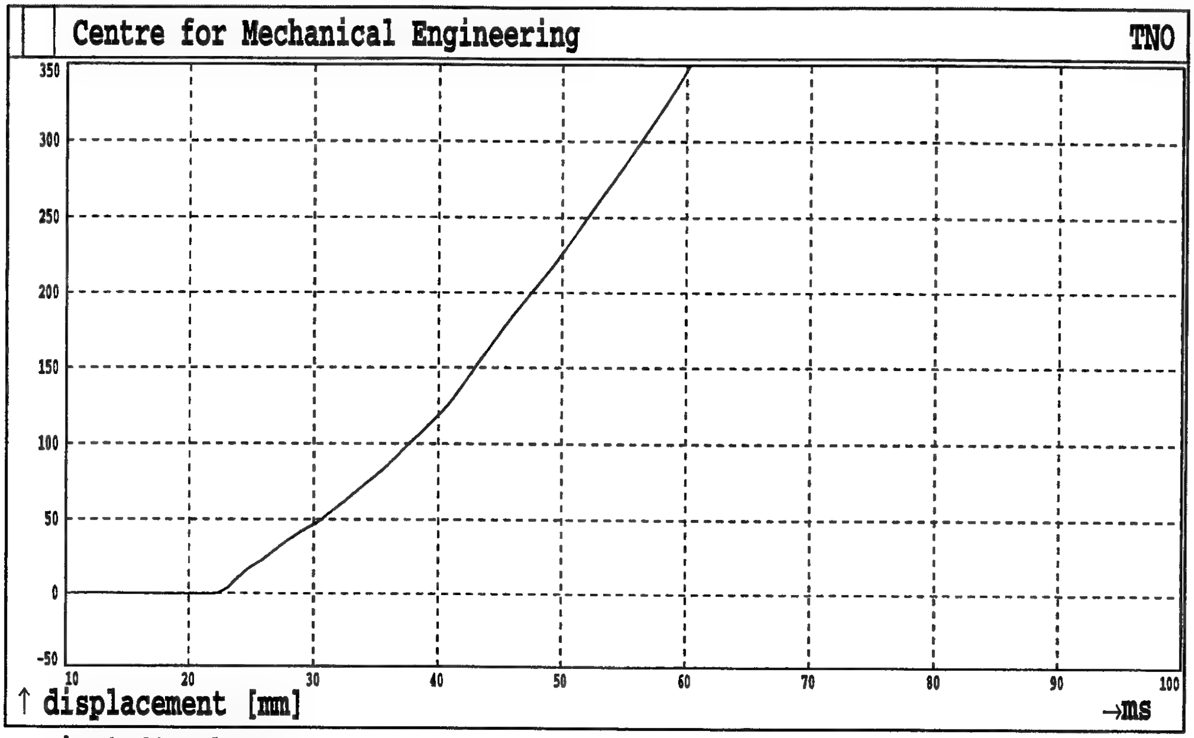

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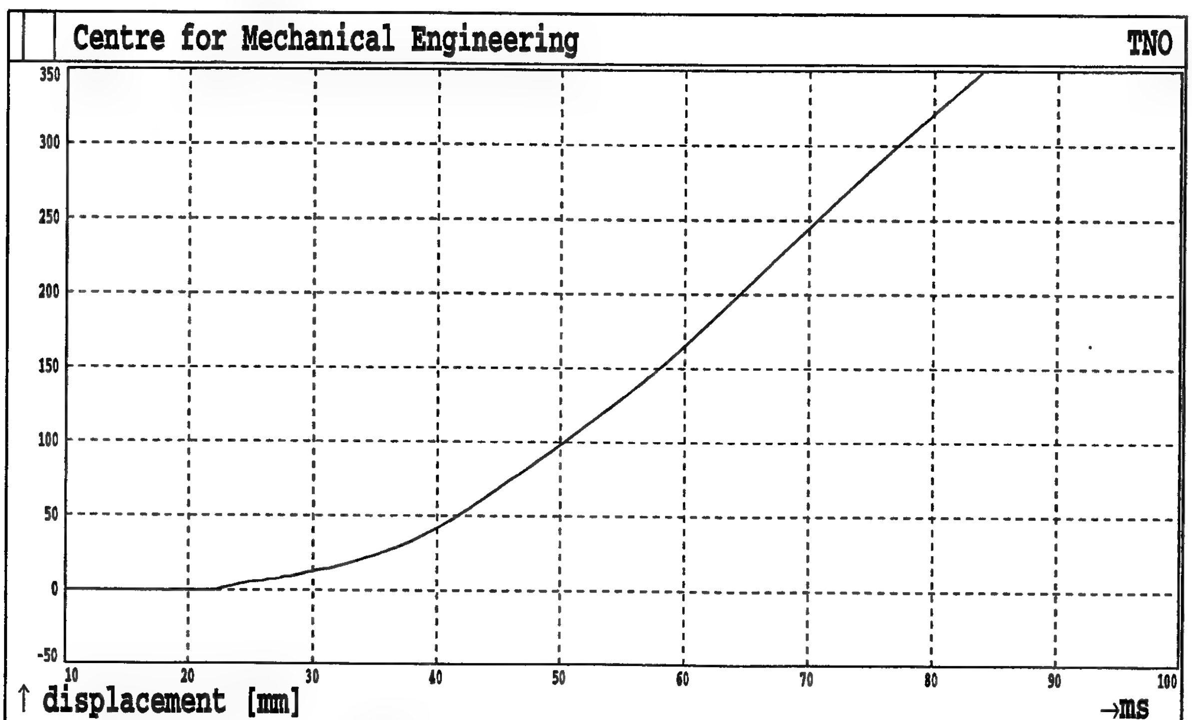

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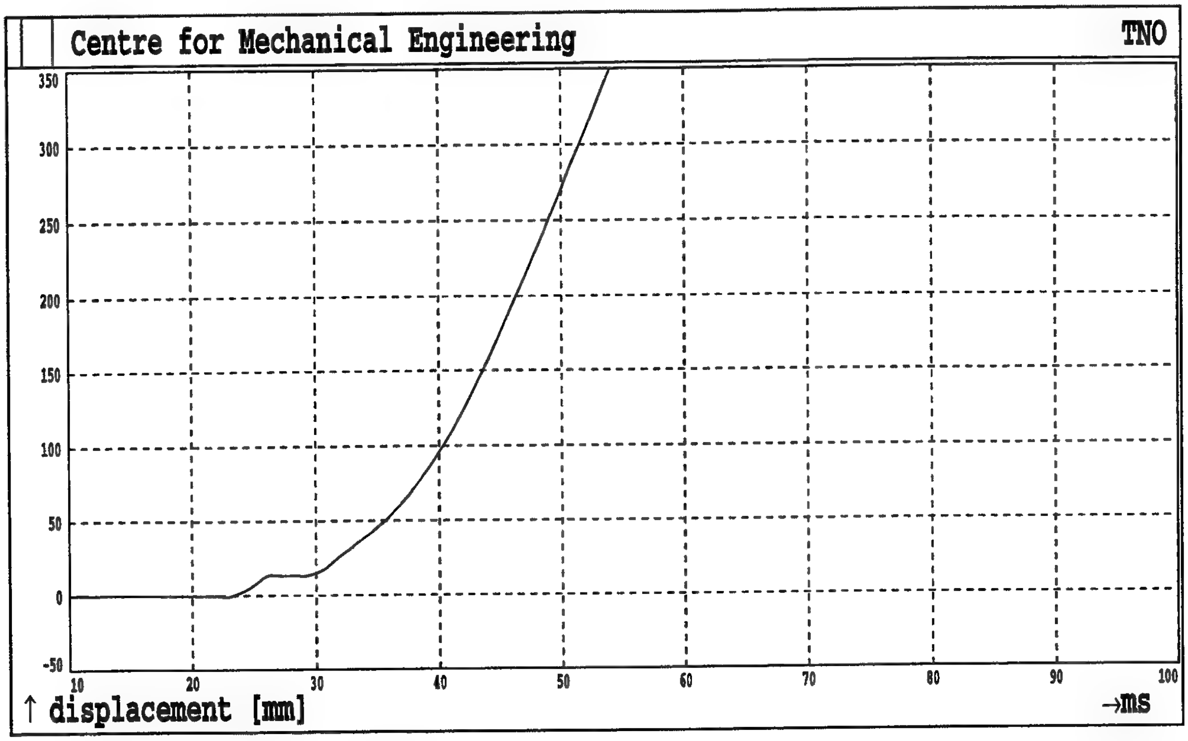

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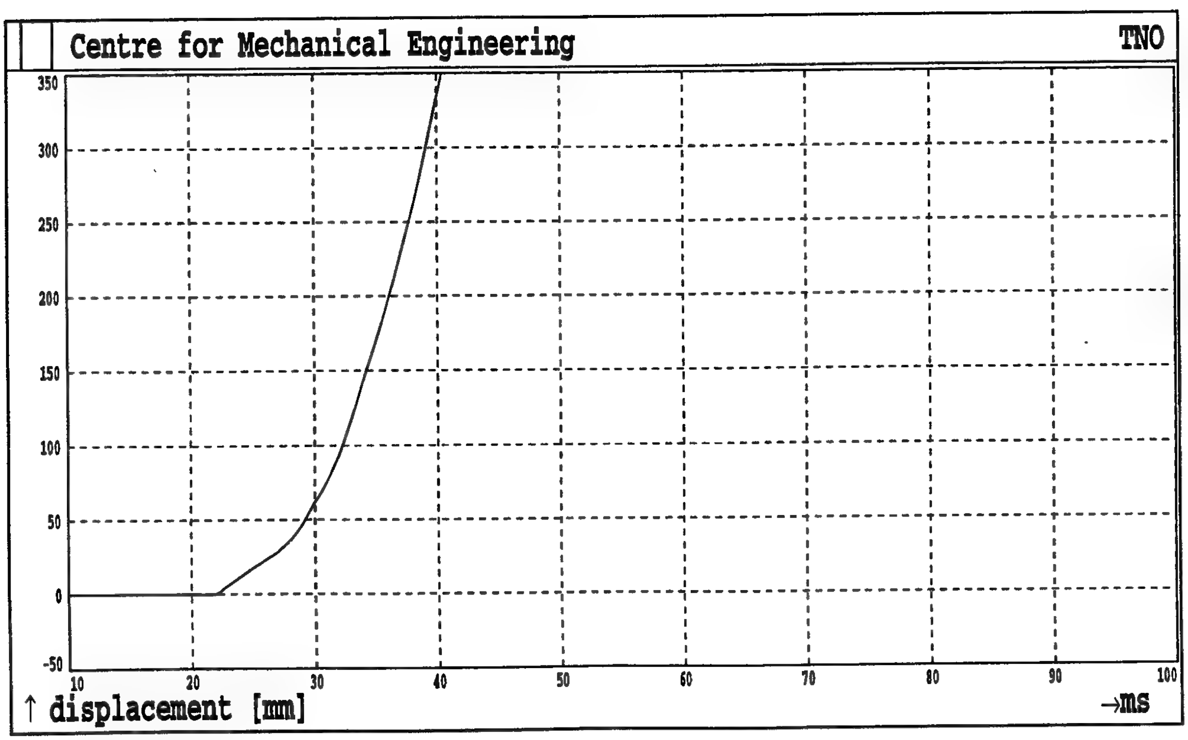

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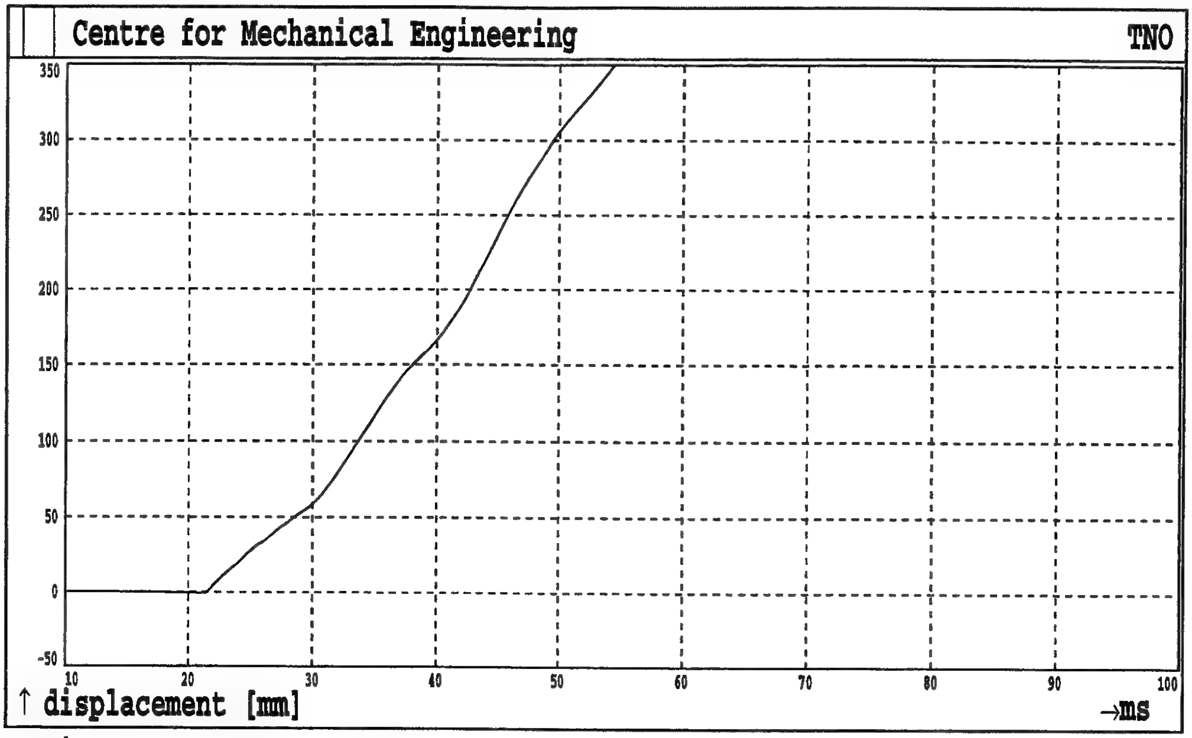

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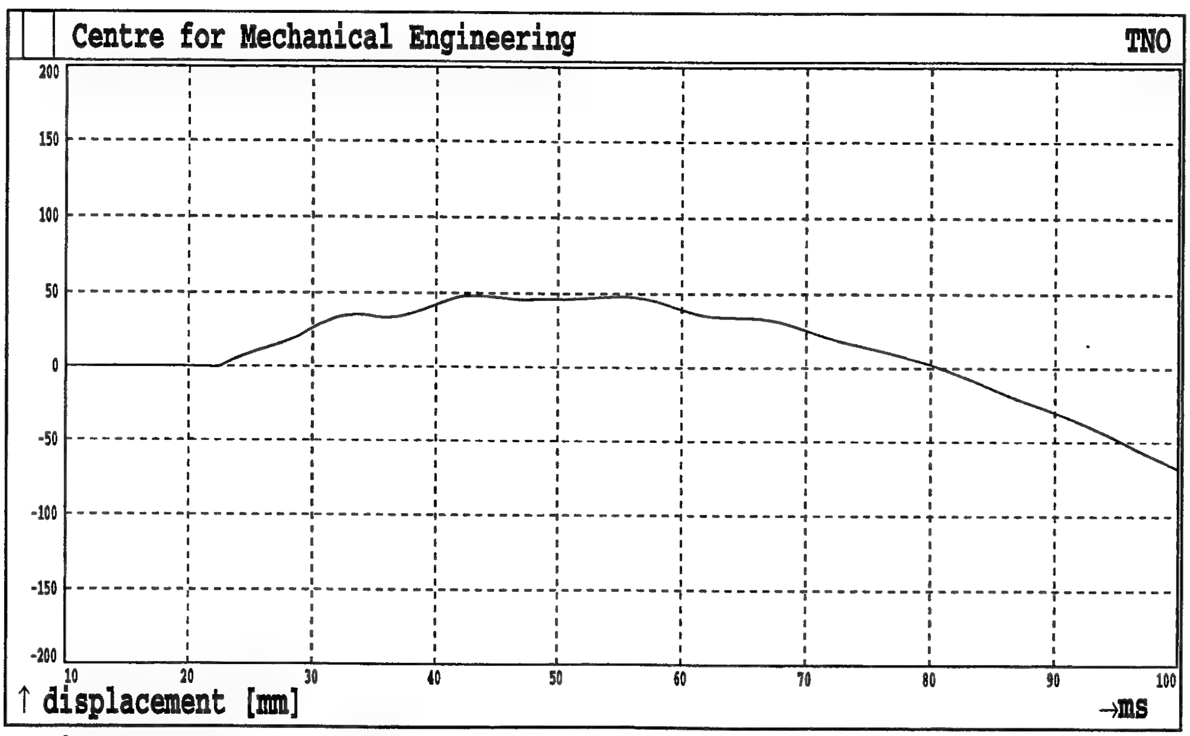

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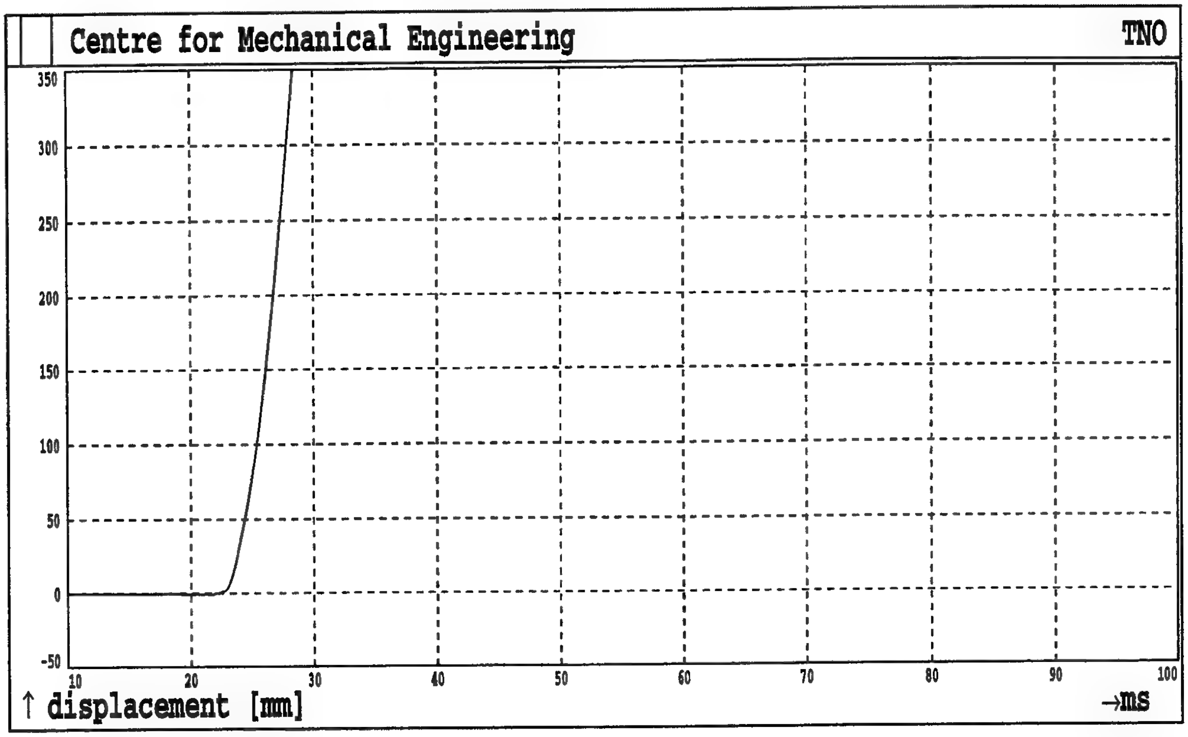

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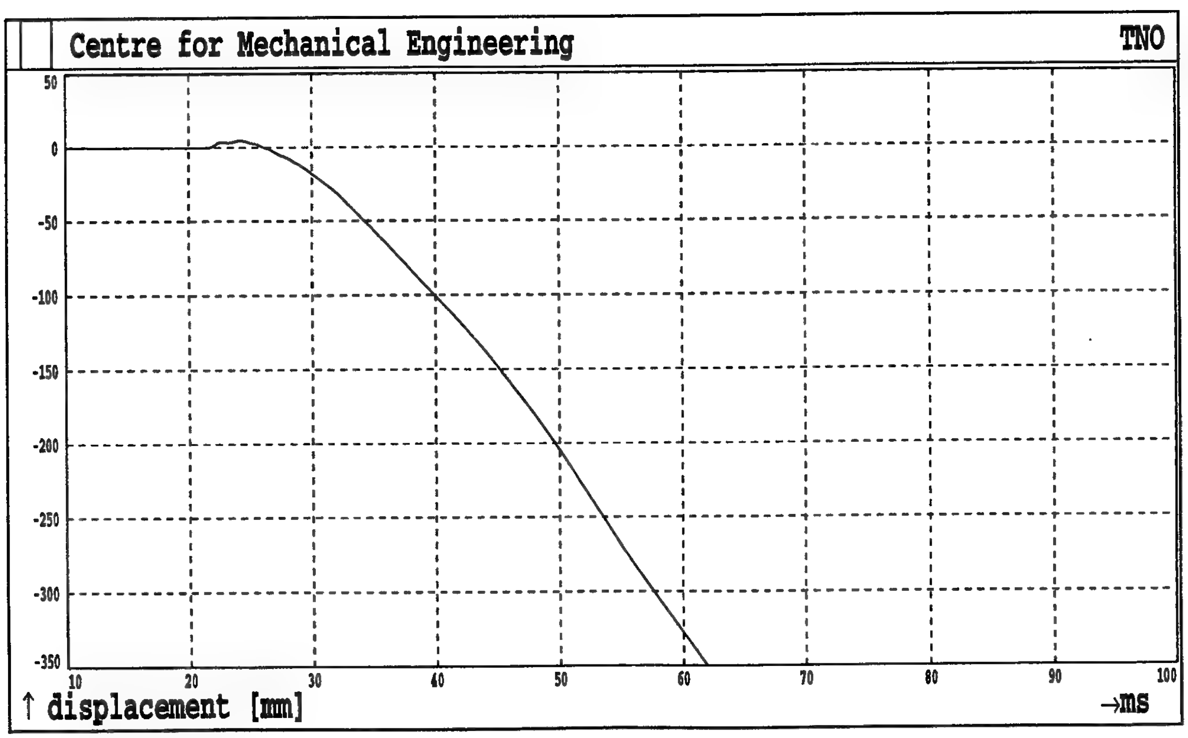

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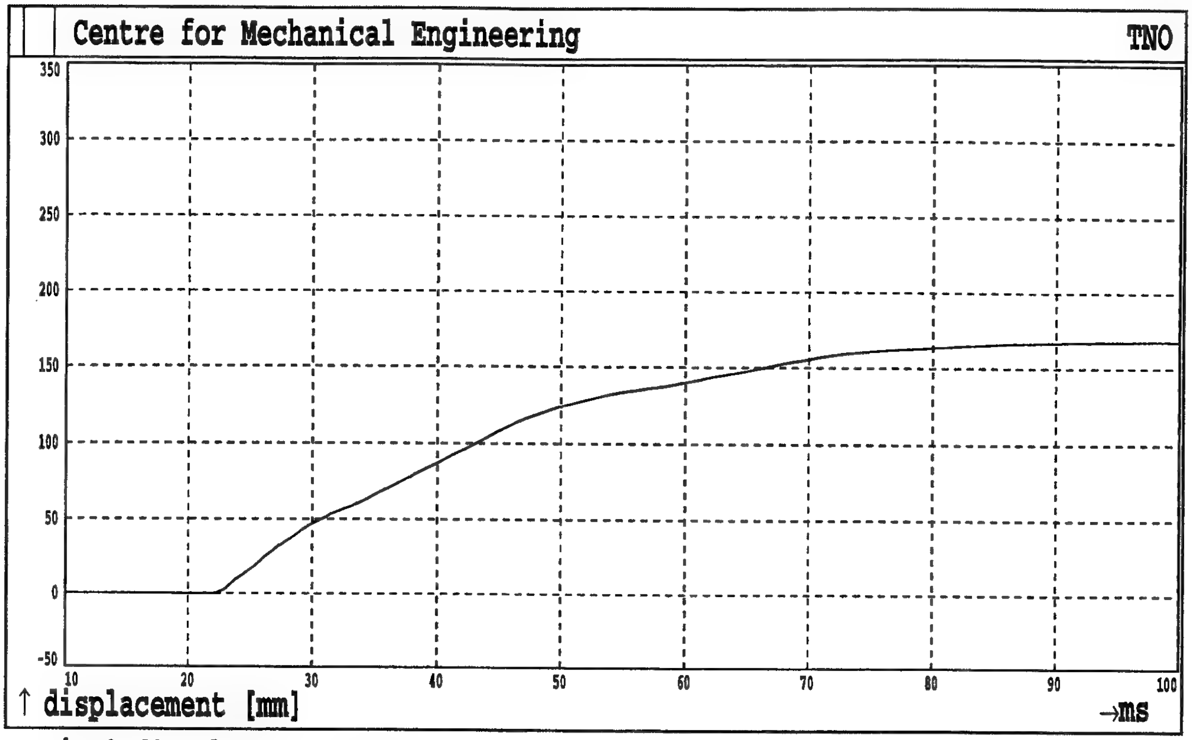

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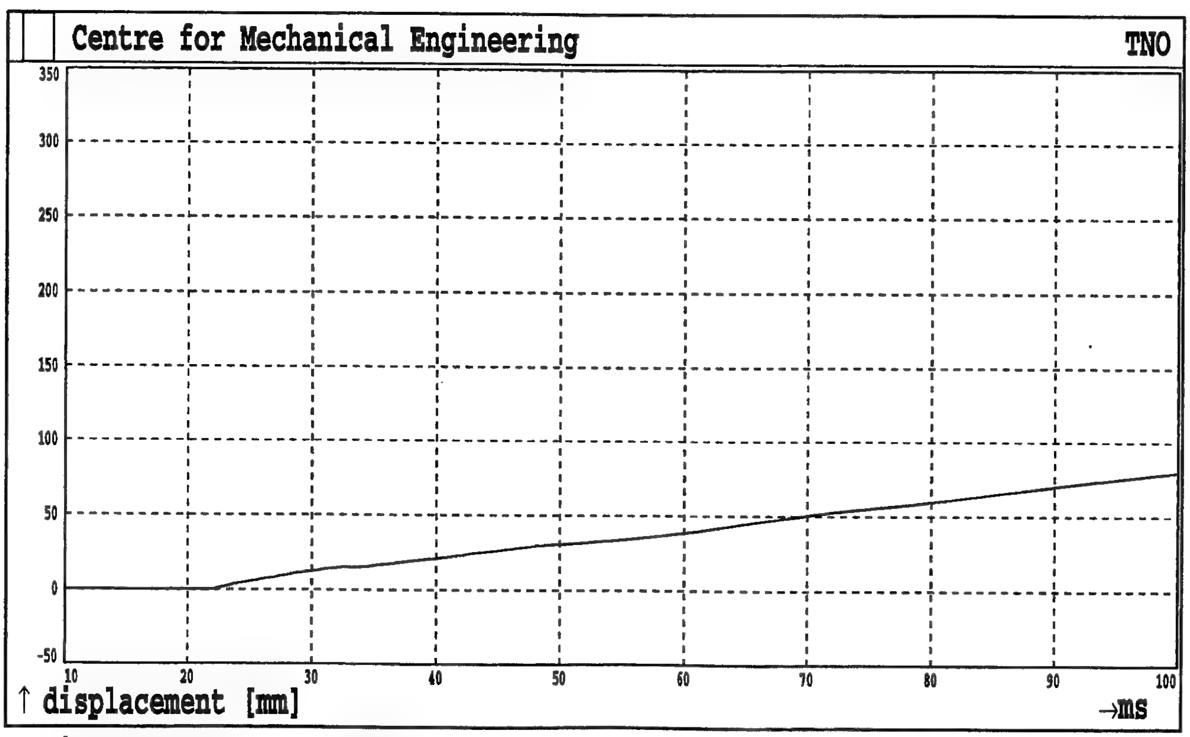

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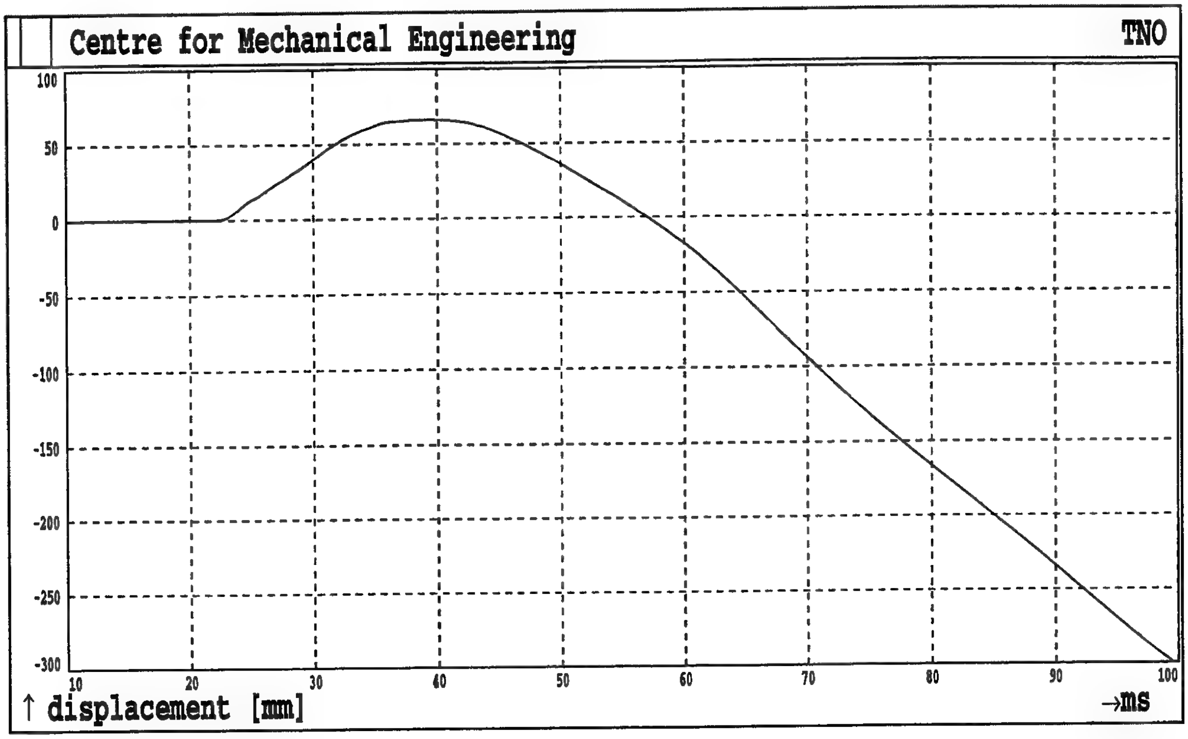

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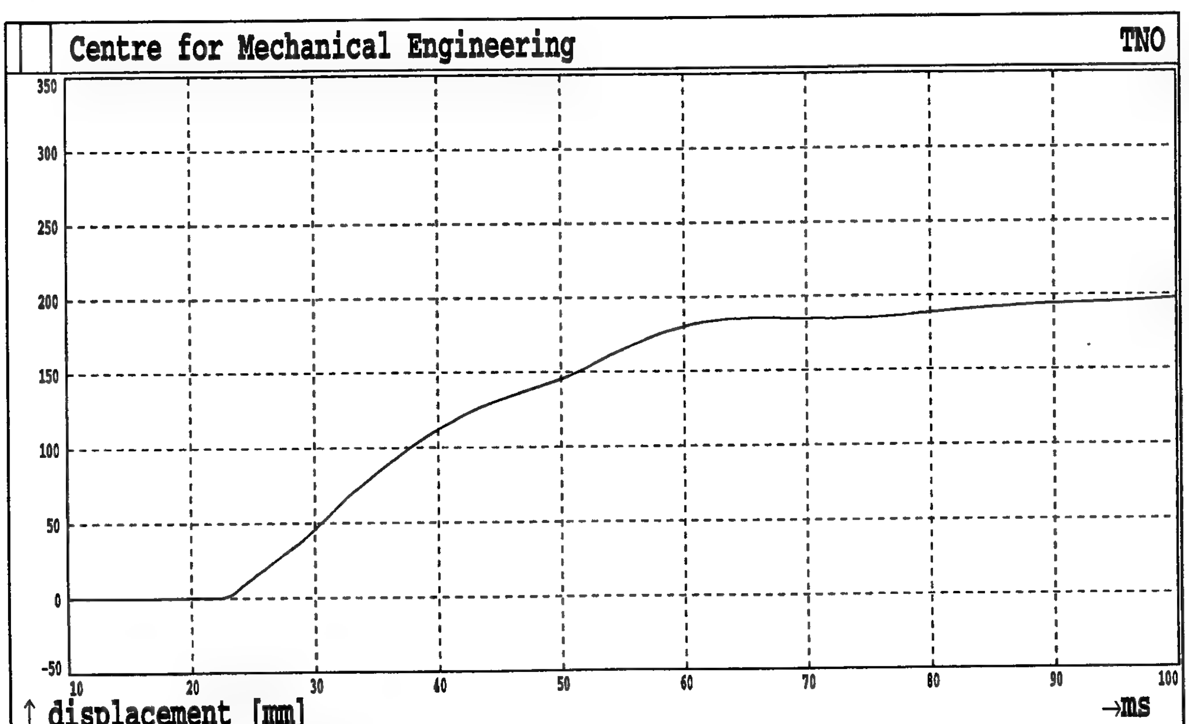

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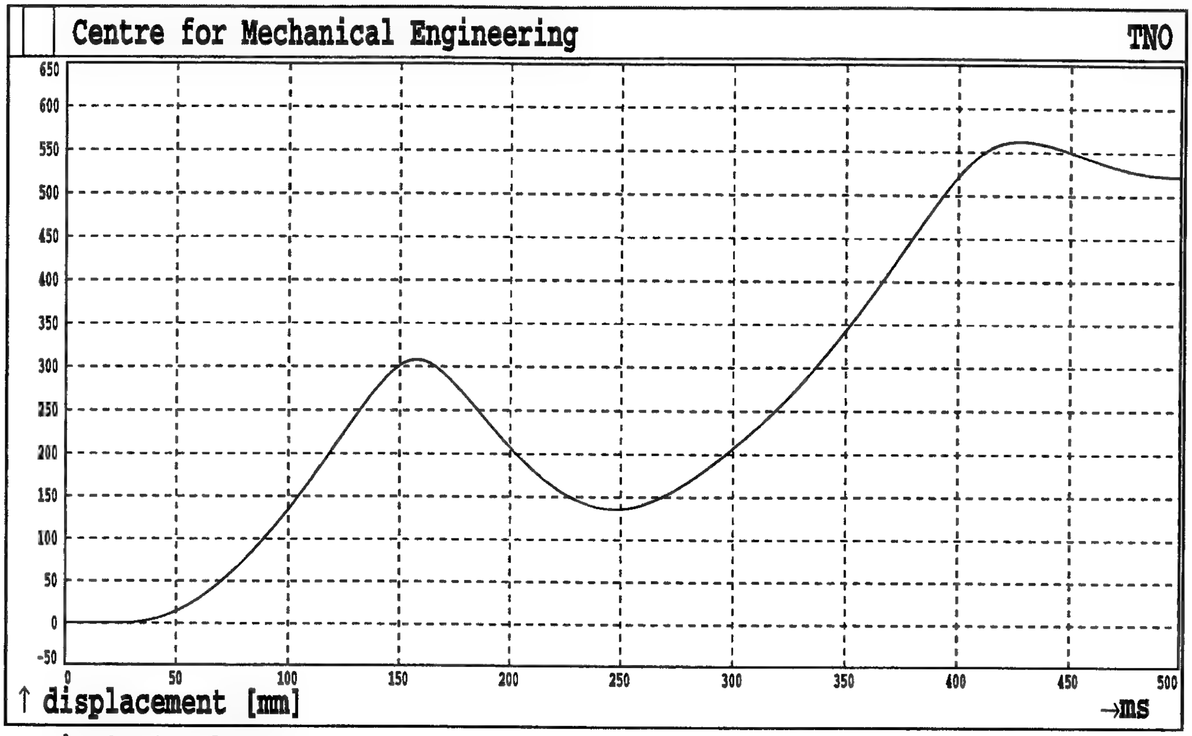

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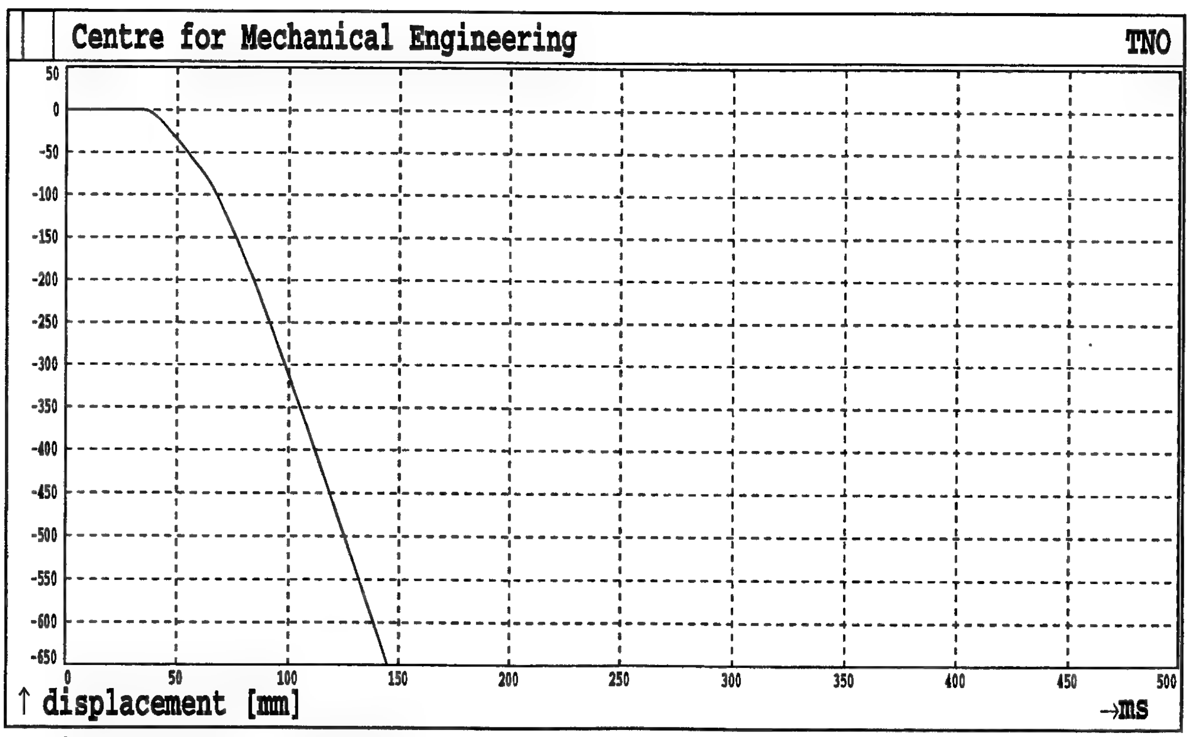

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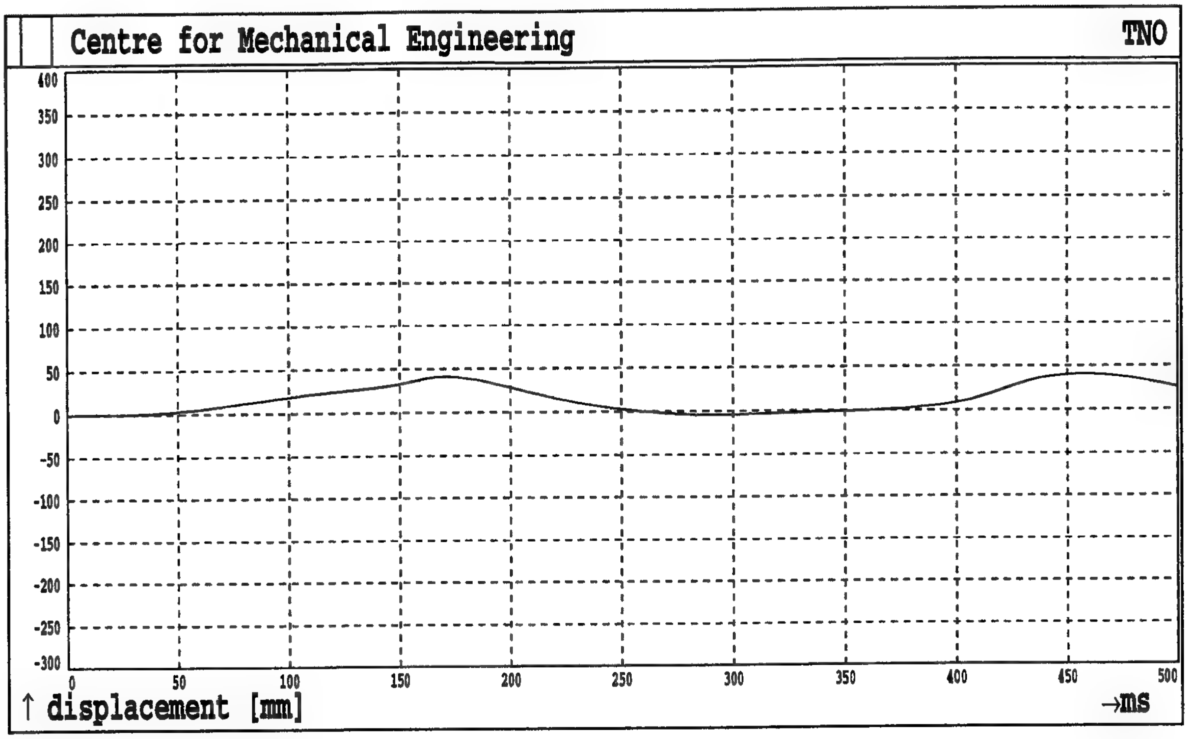

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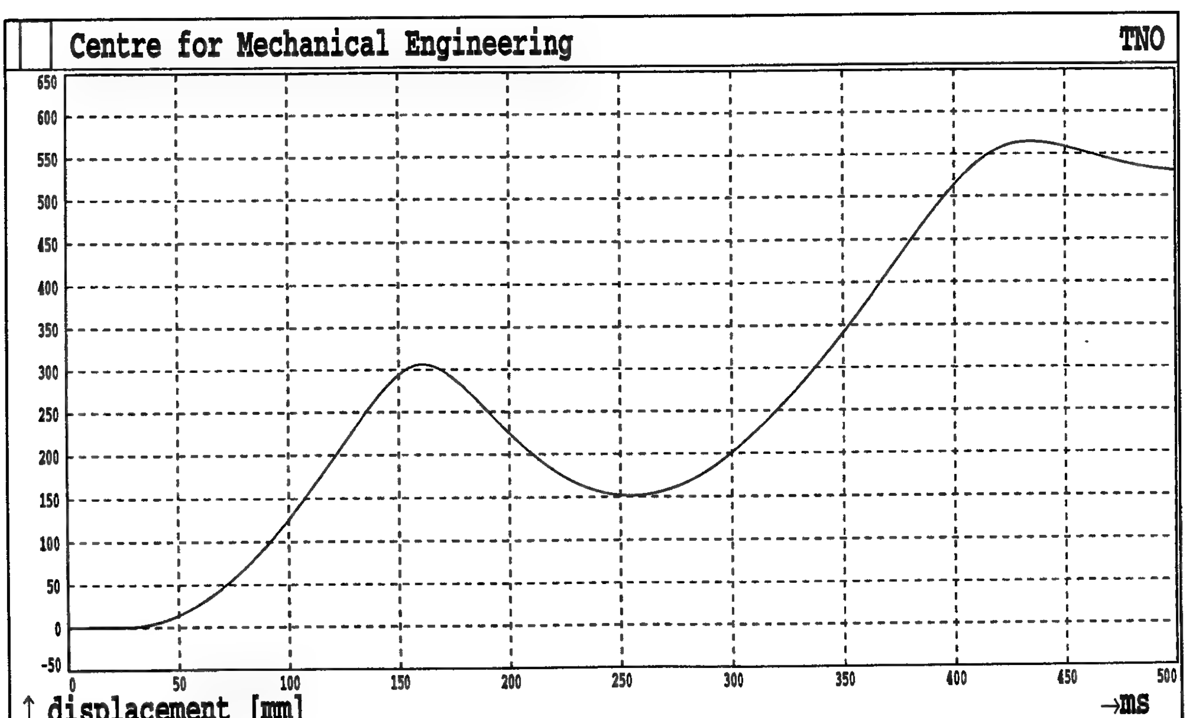

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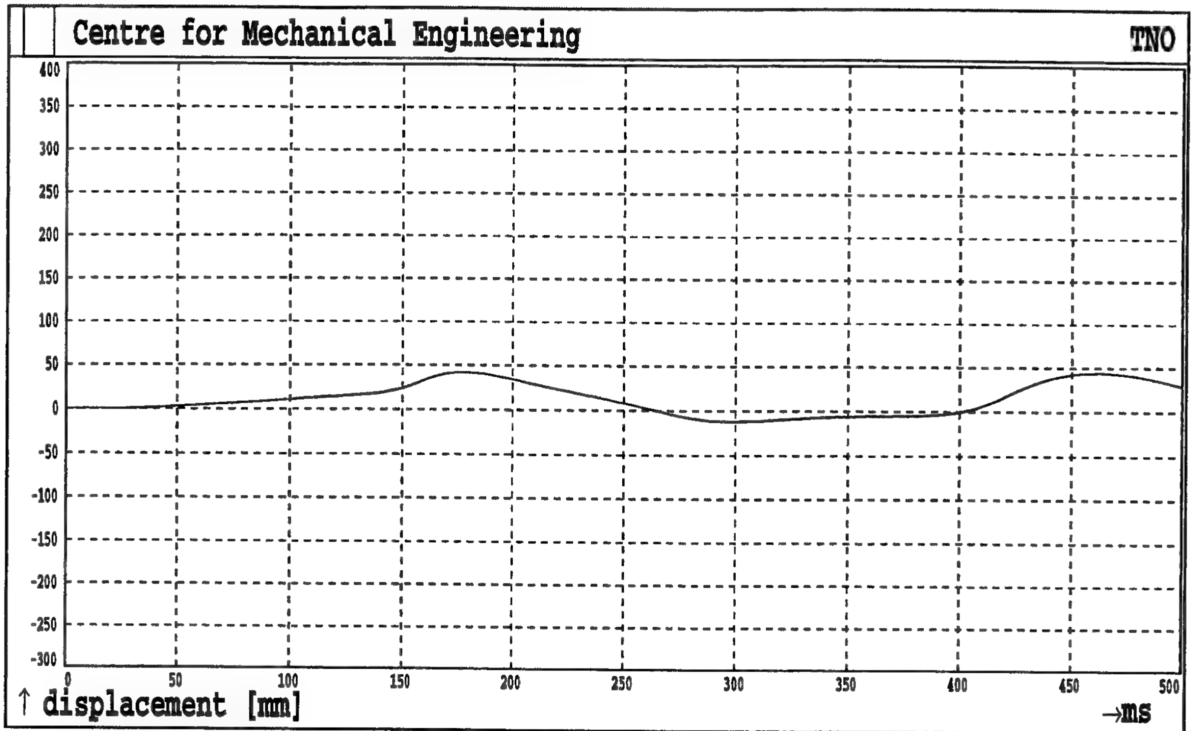

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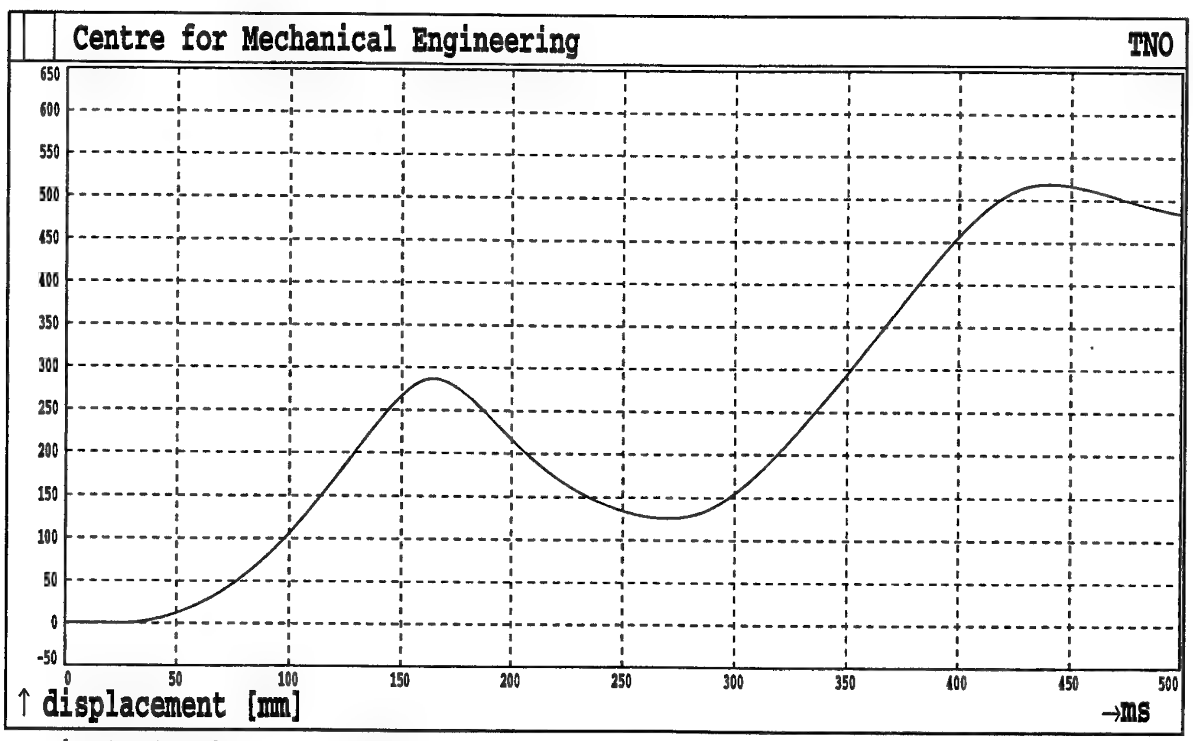

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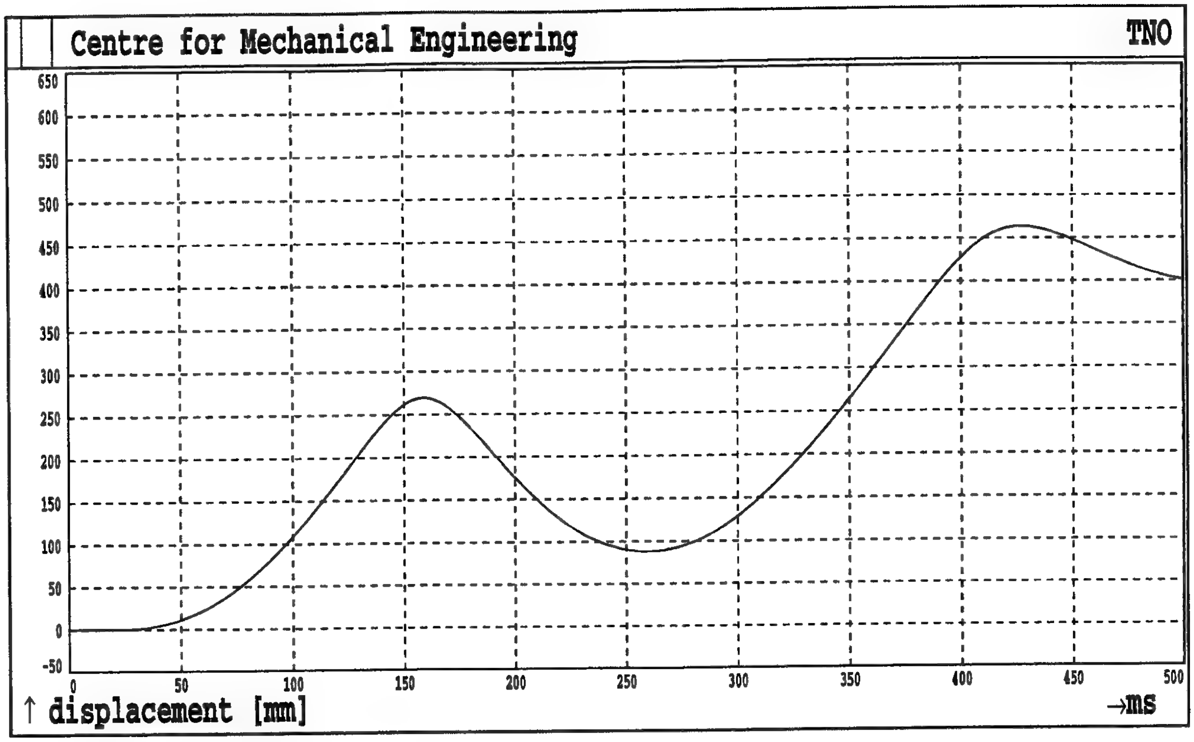

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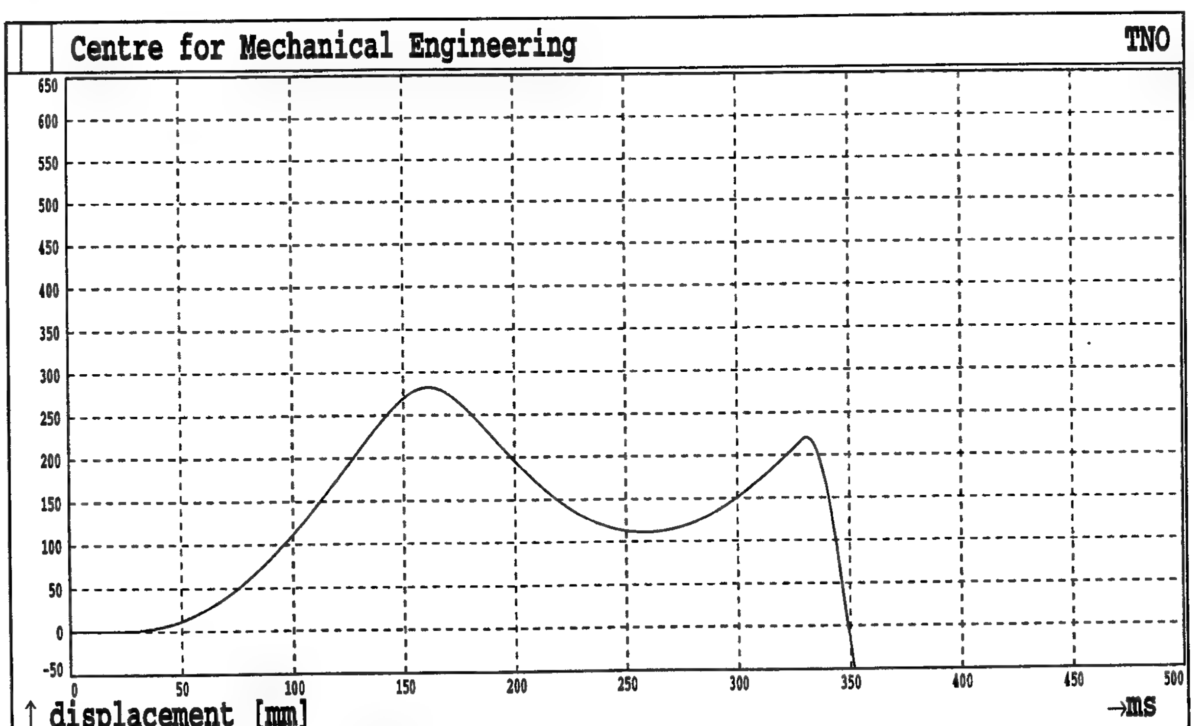

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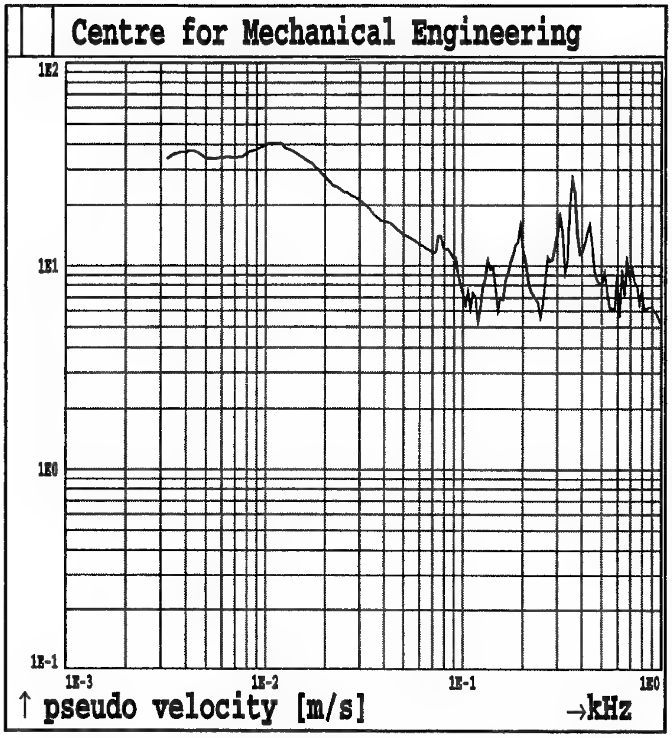

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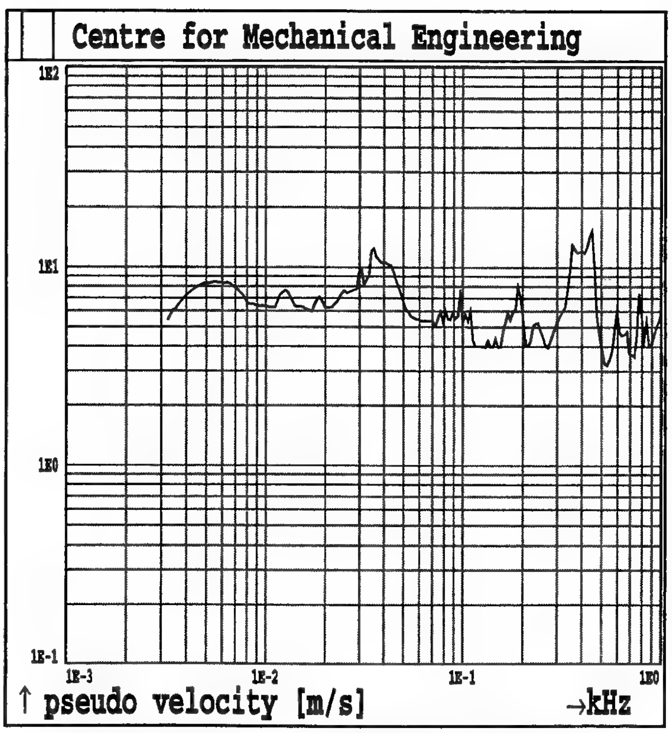

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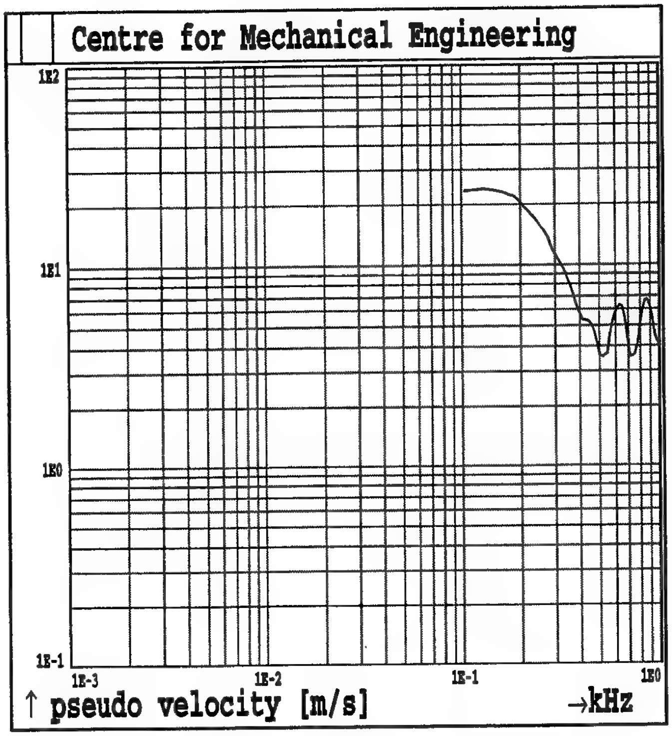

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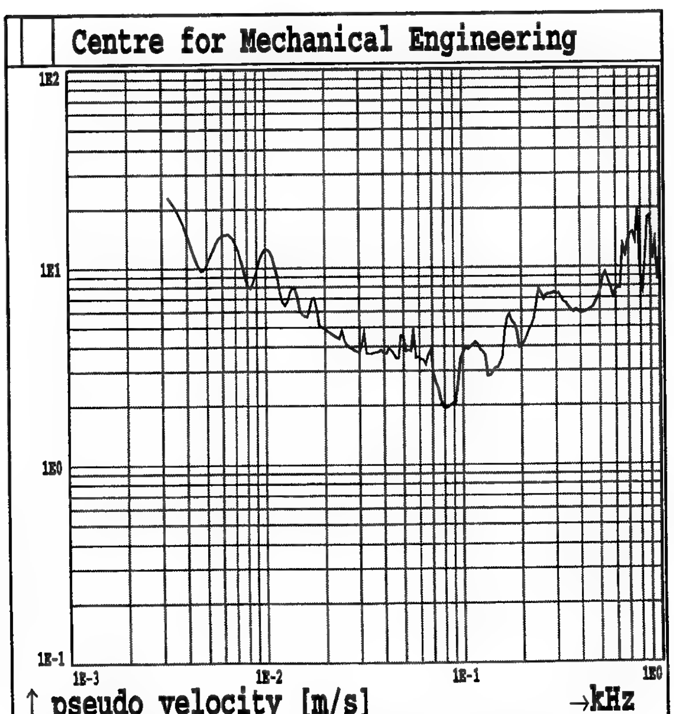

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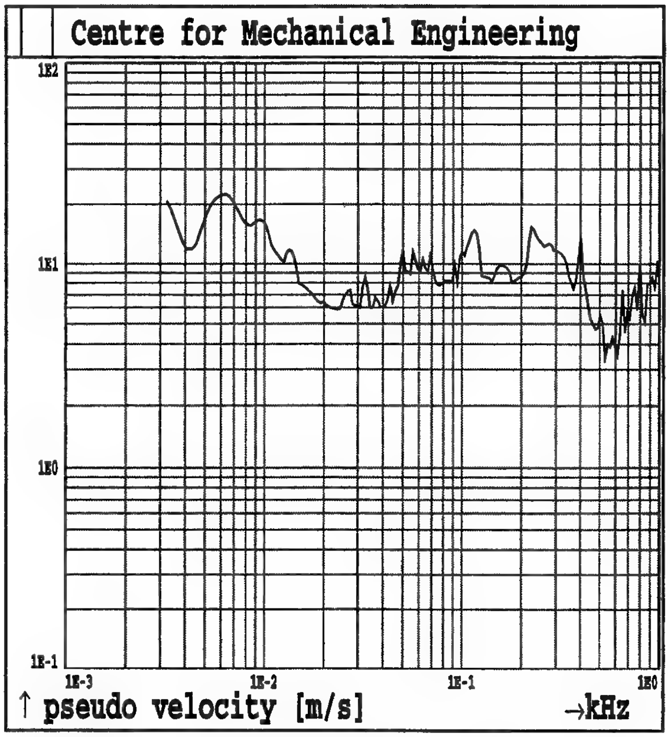

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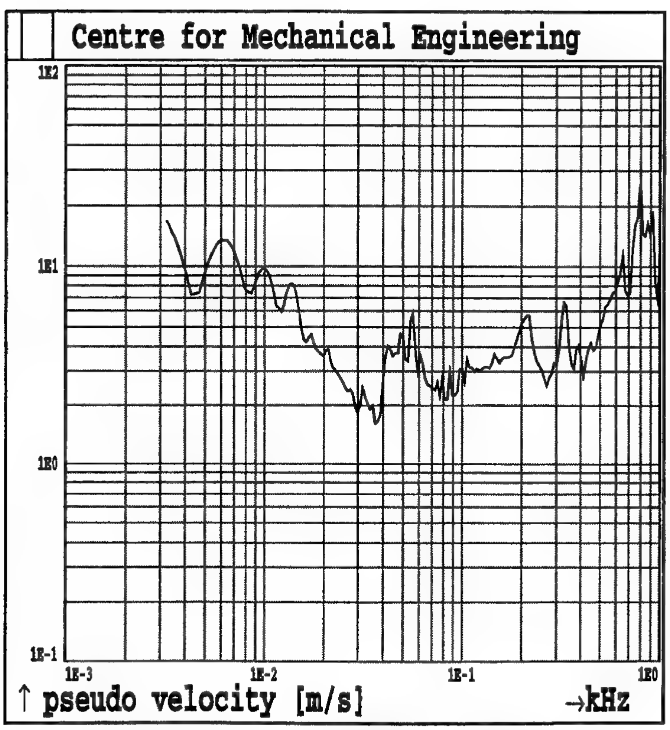

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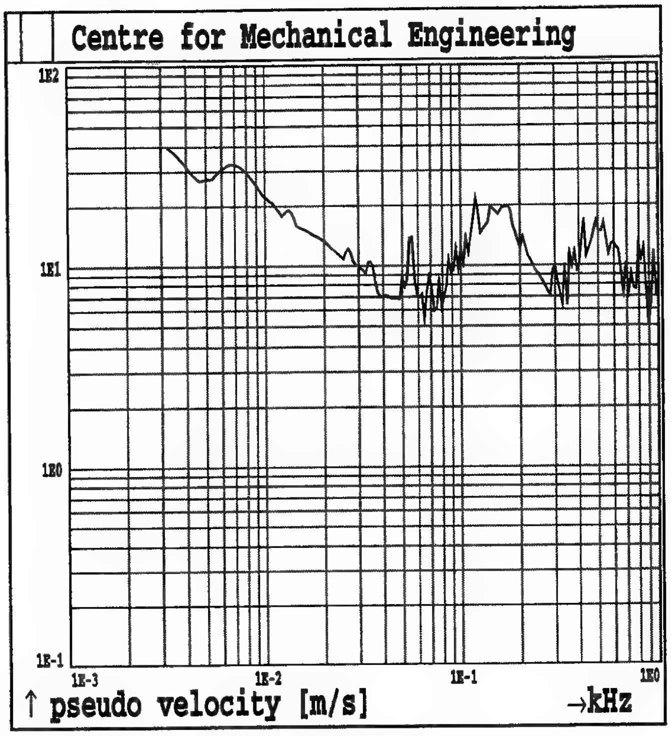

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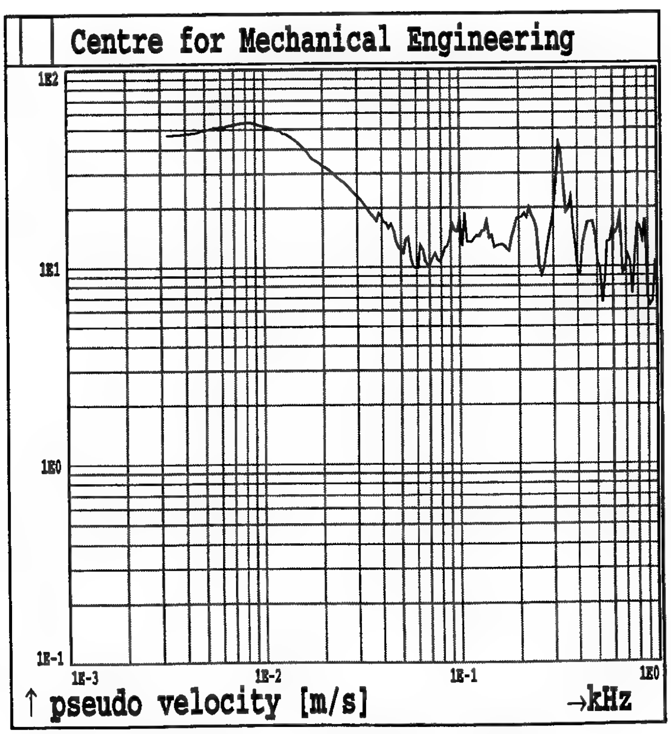

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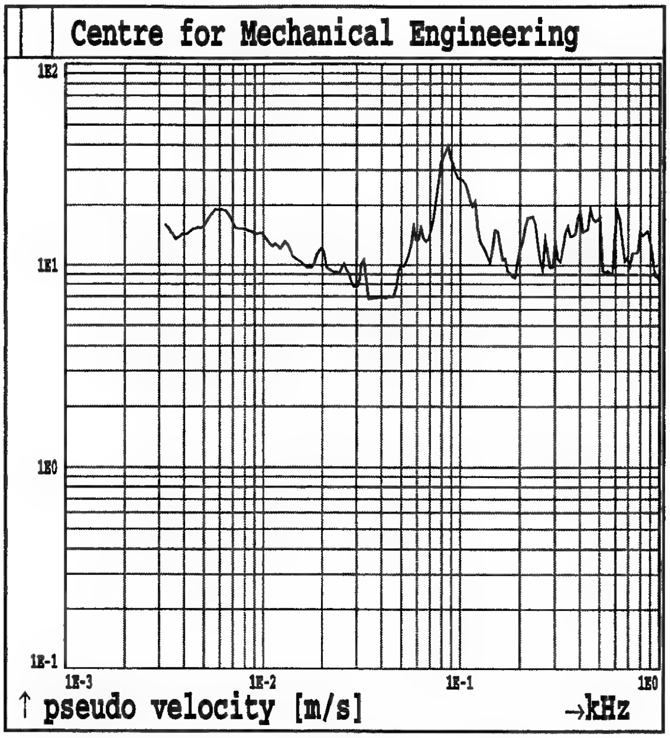

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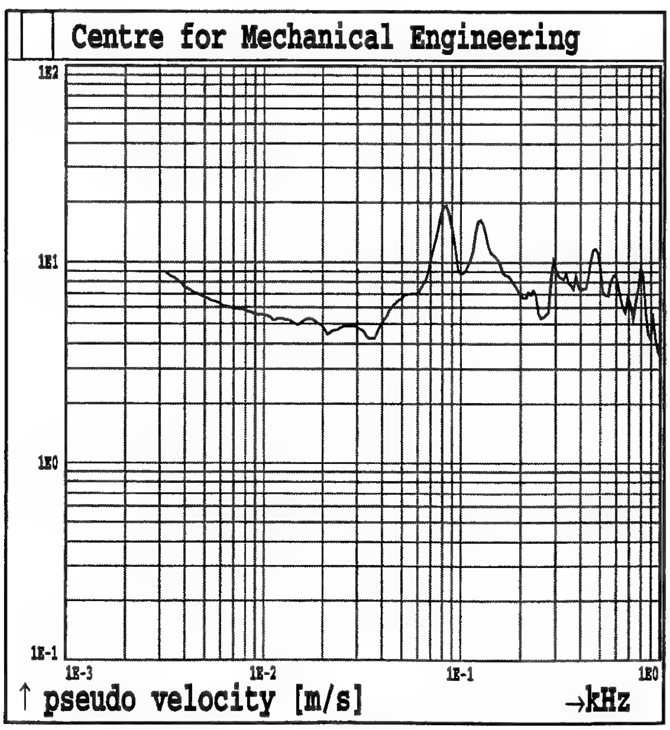

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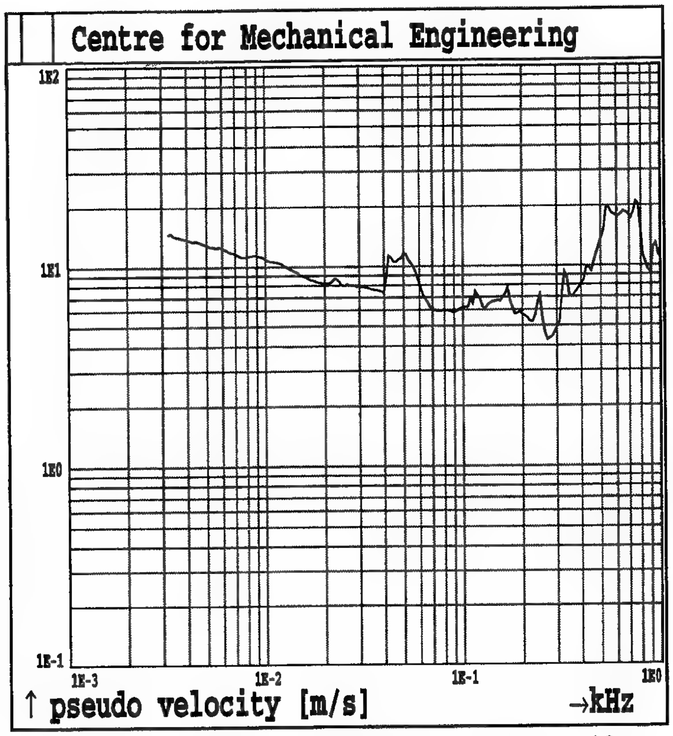

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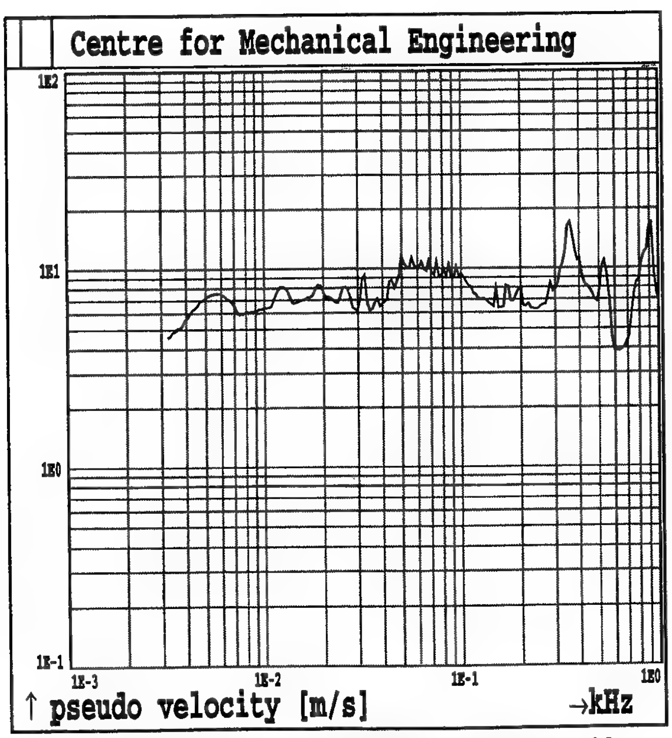

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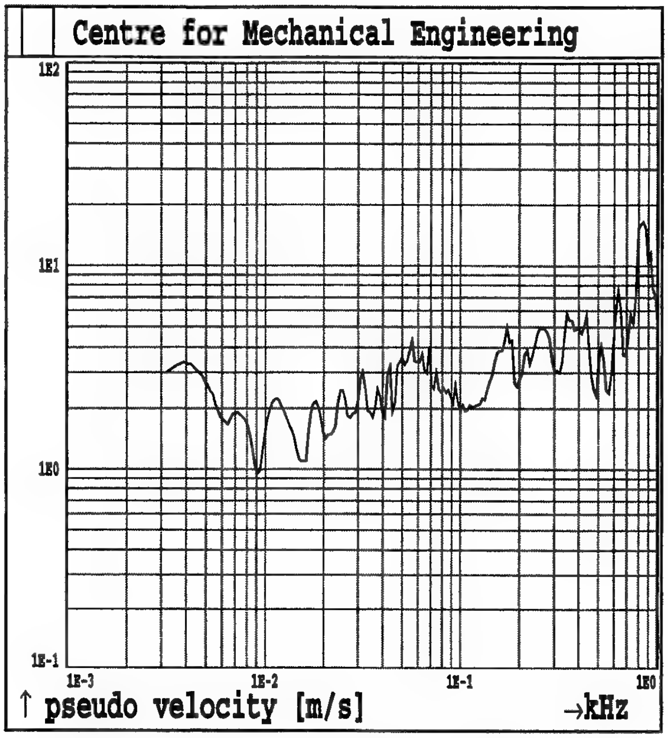

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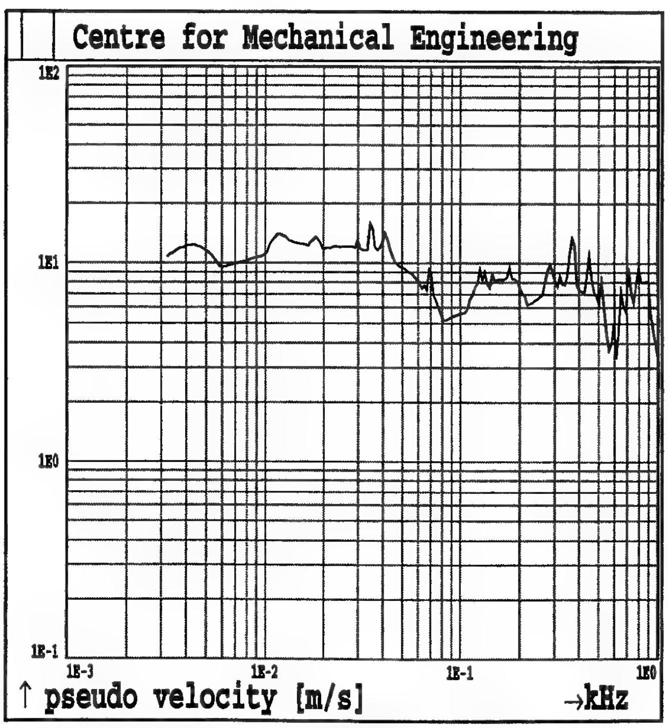

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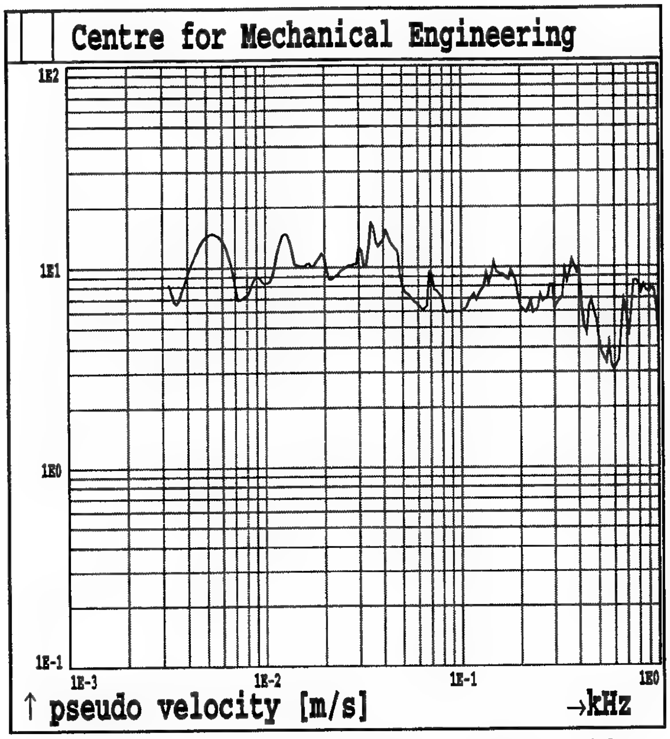

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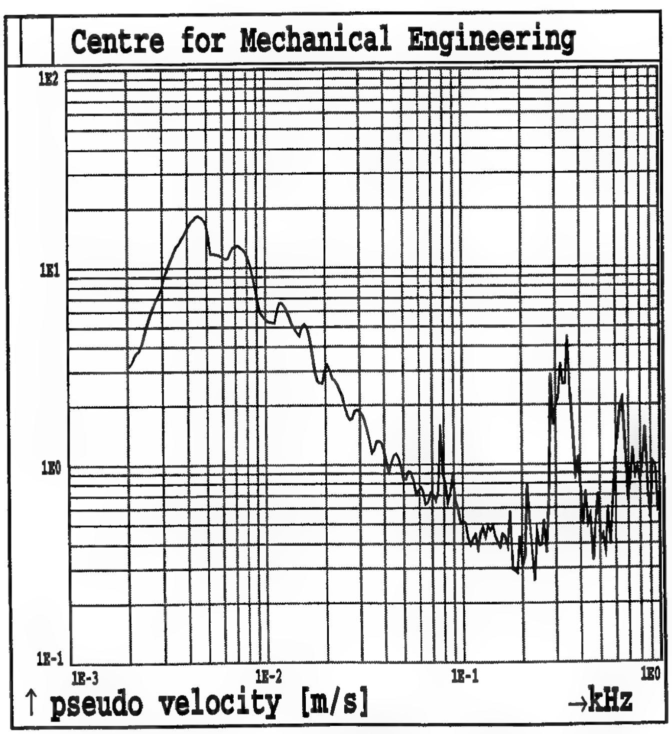

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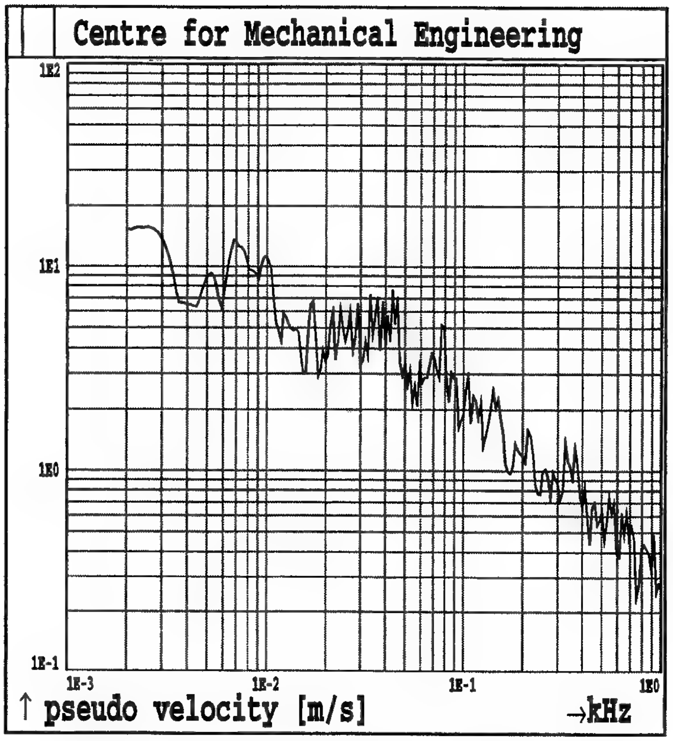

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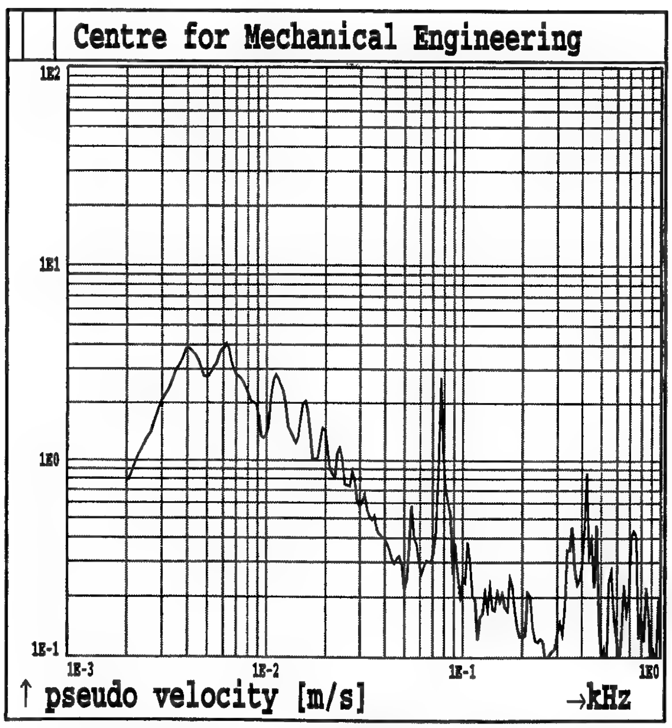

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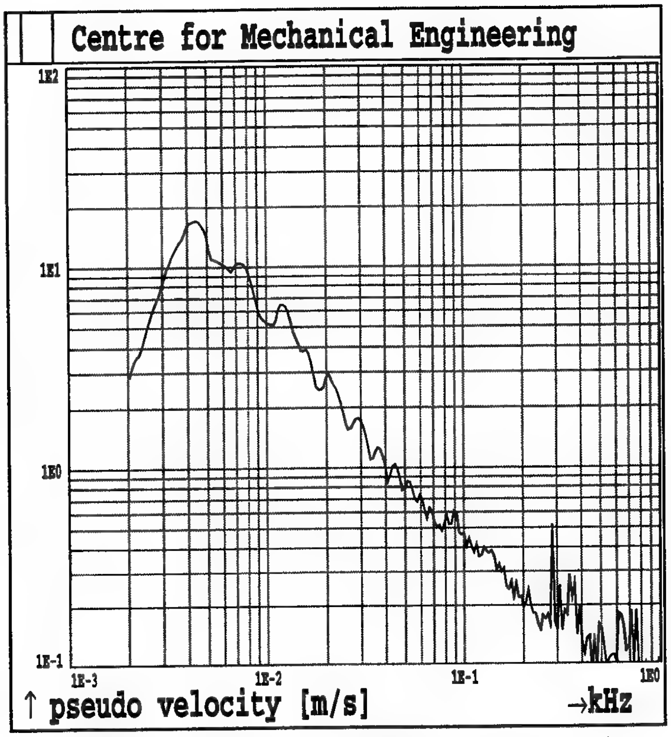

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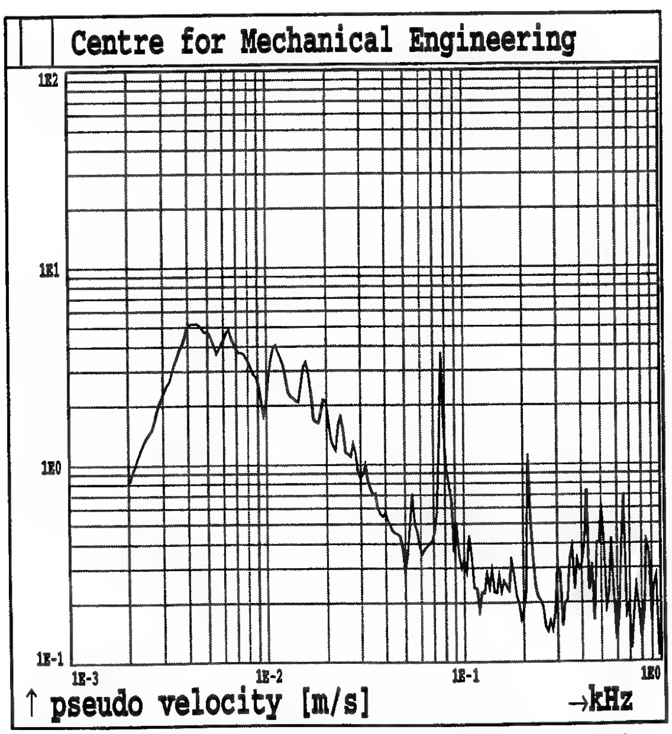

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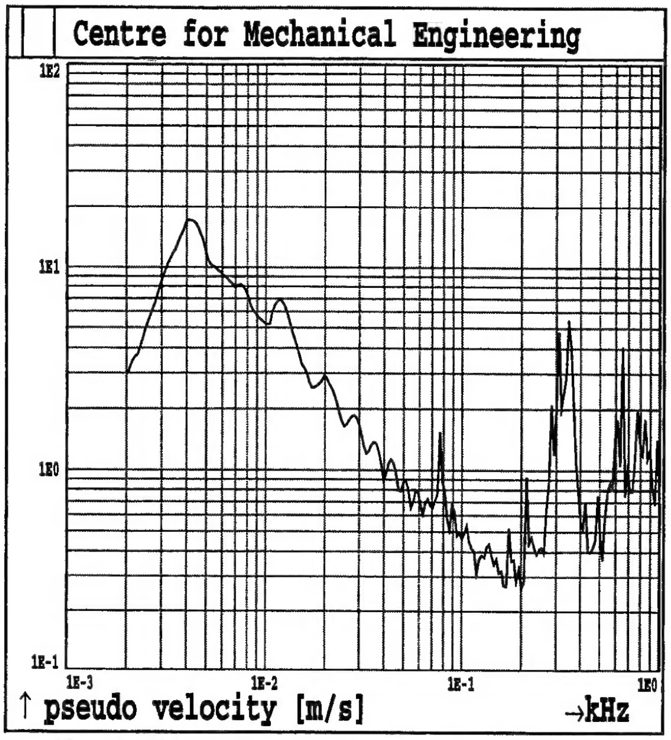

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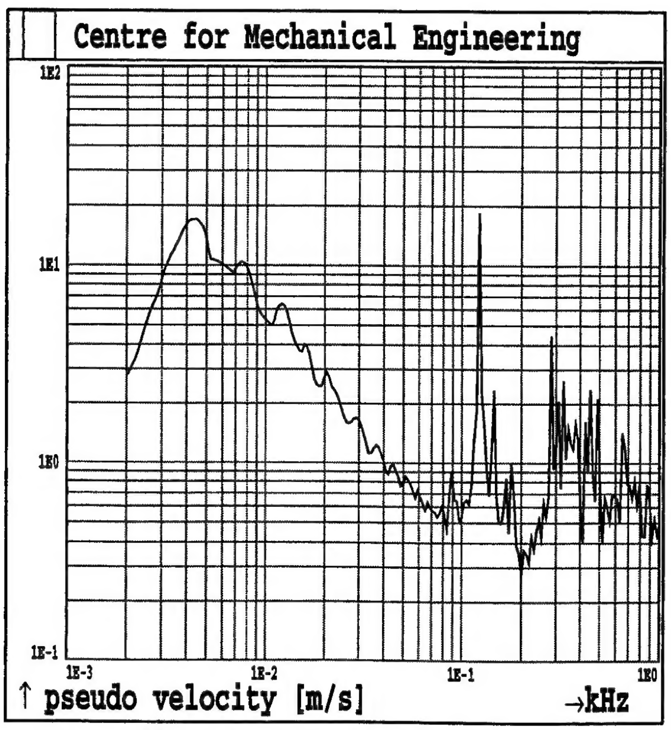

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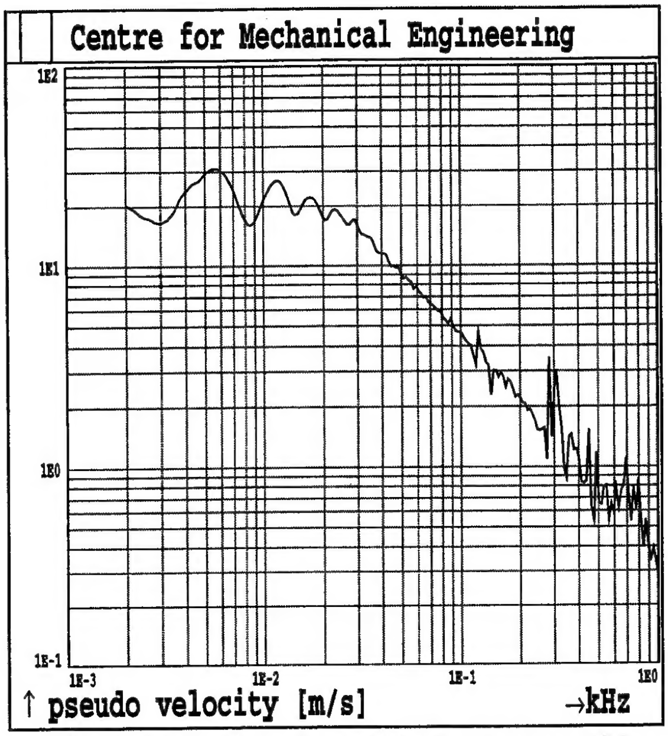

Fig.3B103. Shot 3 MAXIMAX Sensor A24

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15. ABSTRACT (MAXIMUM 200 WORDS, 1044 BYTES)

In the scope of the development of the Trojka drone a test structure has been subjected to a series of 3 underwater shock loads of increasing shock levels.
During these tests TNO carried out measurements with 25 strain gauges, 24 accelerometers, 4 relative displacement transducers and a pressure transducer.
This report presents the measured pressure signals, strain signals, relative displacements, accelerations, the calculated maximax shock response spectra (at 1 % damping) and, by integration of the accelerations, velocities and displacements.

16. DESCRIPTORS Underwater explosion Ship structure Shock response	IDENTIFIERS Shock measurements shock mounting

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